Tallgrass Prairie National Park

Newton County, Indiana

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Photo Taken by the Author

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Final Project Report
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Abstract

The disappearance of the tallgrass prairie needs to be addressed with a large-scale restoration in Newton County, Indiana. The best way to educate the public and professionals about the loss is the creation of a national park that is based around the restoration effort. Approximately 80,000 acres of prairie in northwestern Indiana needs to be restored in order to spur a greater movement across the United States. Tallgrass prairies are home to many endangered species and offer opportunity for research on their beneficial aspects for humans. Newton County is the ideal place to locate the park because restoration efforts have already begun there with the Kankakee Sands Project. It is also located in the Grand Prairie region where prairies historically were located.

The national park features a campground, trail networks, equestrian trials, and various areas to stop at when traveling by car. Furthermore, a bus system will circulate throughout the park for users without cars. The features of the Kankakee sands are enveloped into the greater design, which creates a strong base for the project. Looking at the larger picture, biodiversity is missing from the region; therefore, the attempt at restoring the tallgrass prairie begins to restore native species and creatures. The master plan of the park involves the design of a village near the entry of the park. The village provides a prototype of the prairies and trails that would be found throughout the national park. The buildings and village were built with Leadership in Energy and Environmental Design and Sustainable Sites Initiative requirements and worked with local materials to blend into the landscape.

A national park of significant size was designed in northwestern Indiana. The national park will inform the public and professionals about prairie restoration techniques and the importance of the tallgrass prairie. The park will relay the historical significance of the tallgrass prairie, educate the public, and stand as a landmark for the movement to restore the tallgrass prairie to the greater Midwest. Visitors will come to the site to gain insight on the tallgrass prairie and become inspired to create more change.

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Introduction

The Tallgrass Prairie National Park is located in Newton County, Indiana. The park encompasses about 80,000 acres, which already includes several thousand acres of restoration efforts by the Kankakee Sands project. Sites such as the Beaver Lake Nature Preserve, owned by the state of Indiana, have been working to restore prairies. The site for the proposed park is located about 60 miles from Chicago and 100 miles from Indianapolis.

John Muir once said, “Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and give strength to body and soul alike.” The new park could serve to inspire and awaken visitors to the beauty of the prairie. While being at the park, the public and professionals could also learn about the importance of the prairie and certain techniques to restore it. The public also could be educated about the historical significance of the prairie as well. The park aims at becoming a national destination. Since the Midwest lacks any sort of significant natural draw, the target is to draw in a crowd comparable to the size of Yosemite or Yellowstone.

Prairies used to cover 170 million acres of land in the United States, but now they are only at 1% of their previous capacity. Before settlement, prairies covered 15% of Indiana. The Tallgrass Prairie National Park aspires to generate a national movement of restoring the prairie by serving as an example. Prairies are worthy of being restored because of several different reasons. They are extremely diverse and offer a home to many species, especially ones that are threatened. They also provide plants for human use. Obviously, there needs to be a movement to restore the tallgrass prairie and prairies across the United States. The location of the site factors in to the significance as well. Newton County, Indiana lies at the beginning of the natural region of the tallgrass prairie. Therefore, the park marks a greater entry into the prairie states as one heads westward. The park represents a significant step in national park creation and tallgrass prairie restoration.

Background

Introduction

This research focuses on developing the knowledge necessary to restore 80,000 acres of tallgrass prairies by creating the Tallgrass Prairie National Park. In order to successfully create a national park that is centered on the tallgrass prairie it is important to distinguish the essential facilities that are necessary for park development focused around educating the public. The next important step is to discover which methods are the most successful for prairie restoration and how they will work into the design of the park. Agriculture has decimated the biodiversity of the region; therefore, theoretical and site related methods to increase biodiversity need to be discussed when restoring the prairie on the site. Lastly, the site and the current projects within the limits of the proposed park, Kankakee Sands, need to be investigated in order to bring the project to reality.

National Park Design

National parks came into existence in the beginning of the 19th century and they will continue to be designed and designated into the future. When researching previous designs of the parks, it becomes apparent that there are necessary facilities and functions that national parks need. In order to successfully engage visitors in a park and provide educational opportunities this research will review the historical designs of the national parks. The historical approach can be broken down into park villages, facilities, and interpretative centers. However, to arrive at a comprehensive design for national parks, modern approaches, such as Mission 66, need to be addressed. Features from the modern approach will play a part in the design as well, but historic methods will be the basis. Sustainable Sites Initiative and Leadership in Energy and Environmental Design are modern tactics, which will direct the design towards sustainability.

The village concept arose in the early 1900s. Mark Daniels, the first landscape engineer hired by the Department of the Interior to consult on the development of national parks, brought up the concept of a village and compared it to the Yosemite Valley, an area that hosted five to six thousand people (McClelland 127). The village would offer lodging and supplies along with many other resources such as roads, tent sites, dining halls, camp stores, gas stations, and utilities (McClelland 127). Essentially the village would serve as its own community within the park. This village could potentially have a museum as well which could educate visitors about the area. The Tallgrass Prairie National Park is going to be spread out, therefore it may be a good idea to feature two or three smaller villages to limit the distance it takes for visitors to cross different parts of the park, but one large village will be successful as well.

Daniel Hull, chief landscape architect after the death of Charles Punchard, planned many different park villages (Carr 114). The arrival of automobiles brought about the creation of additional villages to halt visitors from spreading out across the park and damaging various ecosystems. Cars and caravans were destroying the roots of trees in Sequoia National Park (Carr 114). Carr eloquently wrote about Jesse and Aileen Nussbaum, a superintendent and his wife, and their use of historical Adobe architecture for the criteria of a village, in Mesa Verde, by saying that, “the village again exemplified how a unified architectural ensemble could be

conceived as a contextual element of the larger landscape scene" (Carr 115).

A specific amount of detail is required when creating and placing facilities. When Mark Daniels was creating the plan for the village of Yosemite, he was very careful with the locations of the buildings and the architectural style used in order to furnish the most functional and aesthetically pleasing arrangement and also to appear picturesque (McClelland 127). The locations of facilities throughout the design of national parks were based on the desire to reveal scenic vistas or maximize viewer's landscape experience (McClelland 142). When creating facilities for the Tallgrass Prairie National Park, there will be a need to locate certain facilities, such as overlooks or lodging, that give an overview to certain prairie vistas. The overviews provide a visitor the feeling of grandeur offered by the prairie landscape.

Early design of the national parks tried to hide all the facilities and to make the buildings as inconspicuous as possible so as not to interfere with the landscape; however, that changed as designers learned to blend the structures into the landscape (McClelland 148). Money constraints and the lack of materials forced engineers and designers to start using native materials. However, this approach was continued even after additional funds were acquired because using the native materials helped achieve harmony with nature (McClelland 149). Once the buildings fit the landscape and started using native materials, it wasn't as necessary to always hide everything from sight. The blending process will be a necessity when creating facilities in the Tallgrass Prairie National Park since it will be harder to hide buildings from view. Without the presence of mountains or forests, the facilities will have to slide in and out of the landscape to replicate the form of prairies. It would be undesirable to see a large cabin structure standing up in the middle of the prairie. A good approach might be to use a lot of local limestone and work with horizontal, stretching forms, such as Frank Lloyd Wright's Prairie style. It will take a balance of local materials and site selection to have a successful park village and facilities.

It is important to forecast how many visitors will attend the park in order to build adequate facilities. Yellowstone National Park, 3,500 square miles, receives about three million visitors ever year ("Yellowstone Fact Sheet."). The Tallgrass Prairie National Park will be about 125 square miles in size so it obviously will not be attracting as large of a crowd. However, the Chicagoland area, with a population of roughly ten million people, is within 100 miles of the site and would supply a vast number of visitors. Also, the city of Chicago draws in nearly 40 million people a year ("Chicago Fun Facts."). Therefore, the amount of visitors could be a significant number, especially if a transit system, such as a train, was set up from large neighboring cities to the site. It is hard to estimate a definite number of visitors because the park's size will not be as large as other National Parks, but it will be much closer to key cities than Yellowstone and other parks are. Yellowstone offers nine hotels/lodges, which provide over two thousand rooms/cabins ("Yellowstone Fact Sheet."). If one were to proportionally offer as many rooms as Yellowstone provides, then Tallgrass Prairie National Park should provide at least 100 rooms for an anticipated visitor attendance of 100 thousand people. Obviously as the park expands and visitor attendance grows, more lodges and cabins should be created. There are at least five hotels within 50 miles of the site in neighboring towns. These facilities could help in the beginning phases of the park since it will be hard to anticipate attendance. The benefit of locating lodging within the park would be giving the visitor a full experience of being engulfed in the landscape for the entire visit.

Of course there are more to facilities of a park than just the buildings. It is necessary to

also look at the campgrounds, roads, trails, and gateways. Charles Punchard was appointed as the National Park Service's first landscape engineer (McClelland 136). He only served for a limited time, but in that time he had a strong influence on the planning and development of the national parks. He specifically had an impact on various facilities, one example being campgrounds. Punchard placed good drinking water and sanitary toilet facilities as the top priority (McClelland 144). Furthermore, he recommended that the campgrounds needed to be located where there was a supply of water and a possibility to be screened from the road. They also needed to be accessible with graded, surfaced side roads (McClelland 144). Campgrounds are not always the first thing one thinks about when they think of National Parks, but thousands of visitors every year camp in the parks. Especially with the large size of Tallgrass Prairie National Park it will be worth having many places for visitors to stay so they can see more of the park. However, Yellowstone features only 451 campsites for its massive size so it may not be necessary to fill the new park with places to stay ("Yellowstone Fact Sheet."). It will also be a lot easier to manage a smaller amount of campsites throughout the park. The campgrounds that are built may be constructed on vegetated plateaus to look out over the entire park. It would also help protect the campground areas during burns of the prairie. In order to have the campgrounds and other facilities, there need to be connectors.

Roads and trails make up the framework of a national park. They link different sites together and lead a user along majestic views. T. Warren Allen, a representative of the Bureau of Public Roads, spoke about his experience of building roads in national forests, "Roads to subserve commercial interests may be built as to harmonize with the natural features and, without undue extension or circumlocution, make accessible the features of natural beauty. The road as such should be inconspicuous" (McClellan 127). Allen's statements are valid; the road should blend into the landscape and have as little impact on the landscape as possible. Another designer, Henry Hubbard, advised that roads should be surfaced with gravel, but if not possible then to fade away the asphalt roads into the landscape by softening the edges (McClellan 185). Both of the designers had a similar goal of losing the road into the landscape. This could be achieved with pervious pavement on the edges and then melting into some sort of naturalized swale.

When addressing means of transportation, trails cannot be left out. Gabriel Sovulweski, one of the most experienced trail builders in National parks, spoke beautifully about the creation of trails:

> *I believe it is very important that every feature of natural beauty should be taken into consideration and diversion made to bring such features to the eye of the traveler. It will not be necessary to divert from the course laid out, but it is important that trails be laid out along beautiful streams, through different species of timber and interesting undergrowth, alongside and through rich green meadows and dashing brooks abounding in trout, and not omitting a single interesting feature that will attract the attention of the traveling public in order that the trail taken with these features included will be so delightful the traveler will forget his fatigue in a review of the panorama unfolding before him at each turn. The trail along brooks and meadows will lead the traveler to many other beautiful views and points of interest, and finally he should be led to a picturesque spot where he can rest and establish his camp for as long a time as he desires. (McClellan 129)*

Sovulewski's comments from the past are extremely valuable. It is crucial to highlight

the experiences of natural beauty. However, it will be a challenge to create such a varied experience in the large vastness of the prairie. It might be necessary to introduce slight topography changes to the flat landscape to create different vistas. Furthermore, water features, such as streams and wetlands, might be introduced to the site to encourage more wildlife and offer different features to engage. The vastness of the prairie is an amazing ecosystem on its own though. Once users realize the experience will be different than passing through valleys and climbing mountains, they will discover all the birds, grasses, forbs, butterflies, and other wildlife that is alive in the prairie.

Additionally, gateways are an essential part of the park experience. Stephan Mather, assistant to the secretary of the interior, urged that gateways to previous national parks were to be simple, dignified, and in harmony with their environments (McClelland 124). This theme carries over to a lot of the pieces of a National Park. Gateways should be enough to draw attention, but not to distract the user from the park itself. Ones that are created from natural materials seem to blend in the best. It might be best to use oak trees as part of the gateway because of the history of oak barrens on the site.

Lastly, it is important to look at how education is being dealt with in national parks. Historically, rangers have often lead groups out on hikes and been the ones to tell the story of the national parks. Over time, interpretative centers and publications have been created to augment the effort by the park rangers. Bob O'Brien, professor of geography and avid national park visitor, wrote about how the number of exhibits and informational signs are increasing because of budgetary restraints, but he pushed for increasing ranger talks, nature hikes, and creative programs because of the immense wealth of knowledge within these resources (O'Brien 145). It will be beneficial to have both resources in the Tallgrass Prairie National Park. Obviously budget restraints could keep the amount of rangers to a minimum, but it could be supplemented by a volunteer basis. Interpretive signs could be placed all throughout the park highlighting different plants and animals found from the prairie.

Mission 66, a multimillion-dollar program in the United States that addressed higher attendance of visitors decades after WWII, started to tackle education and interpretation by the creation of visitor centers, information stations, publications, exhibits, and roadside displays (McClellan 465). The mission started in 1956 and ended in 1966, and in that time more than one billion dollars was spent on improvements to the parks spurring the creation of visitor centers. The Park Service never had one building to hold visitor facilities, interpretive programs, and administrative under one roof before the creation of Mission 66 (French). However, these visitor centers and other buildings took on a new approach to architectural styles in the parks. The new buildings embraced a contemporary structural form and had a bold commercial appearance, which would entice visitors. Additionally, the buildings were prominently positioned on major roads and screamed for a user's attention (French).

The movement made great progress for education because of its integration of interpretative centers into visitor centers. It also was the largest program for park improvements ever initiated by the National Park Service (French). Nonetheless, Mission 66 disregarded park design of the 1920's and the picturesque design and replaced it with modern architecture (McClellan 464). A user should not be distracted from the landscape by a large building made of concrete. The subtle naturalistic harmonies of the past designs should be transferred into future design because that is part of the classic national park design. The historic designs relied on local materials and ensured that the building warranted the same

attention as the surrounded landscape or less attention. The historic approach also cost less money without the need for foreign and expensive materials. Mission 66 contributed the creation of the visitor center and other magnificent features, but the architectural styles of rustic design should be the basis of any buildings in the Tallgrass Prairie National Park. New programming and building uses can be derived from the modern approach, but the aesthetics should hold true to the original image of national parks.

Two modern approaches that are essential to be integrated into the creation of Tallgrass Prairie National Park are Sustainable Sites Initiative and Leadership in Energy and Environmental Design. The SSI (Sustainable Sites Initiative) sets up recommendations for an overall sustainable design. SSI looks at site selection, pre-design assessment and planning, various site design principles, construction, operations, maintenance, and monitoring and innovation ("Reports."). While designing the park it will be critical to look at the suggested prerequisites. The buildings will not be explicitly designed in the creation of the national park, but LEED (Leadership in Energy and Environmental Design) will be encouraged. The buildings will be built achieving the highest ranking available from LEED. The two sets of guidelines will help move the park towards a modern, but historic design.

The successful creation of a national park requires an amazing array of facilities and resources. The implementation of villages will help to center many facilities within the park, but throughout the park roads and other features should blend into the landscape. The architectural forms that are created will get their inspiration from the local landscape and feature native materials. Modern approaches, such as visitor centers and improved educational centers, are important features to add to the design. However, stark, commercial architecture will be avoided and replaced with rustic, but sustainable design. A new era for national park design will begin.

Historical Significance of the Prairie

The prairie ecosystem used to cover a large section of the central part of North America. It hosts thousands of species of plants and insects, along with many other wildlife species. Now the prairie is essentially gone. The proposed Tallgrass Prairie National Park will serve a purpose of reflecting the historical significance of prairies in Indiana and the rest of the United States with two different methods. The first method will be utilizing and researching historical medicinal uses of prairie plants. Then the other method will be educating about the endangered species that rely on tallgrass prairies and how the new park will encourage the return of those disappearing species.

Appearing 8,000 to 10,000 years ago, prairies historically covered nearly 170 million acres in North America ("A Complex Prairie Ecosystem."). It is commonly understood that the prairie is a complicated system, but it is little known that it is actually one of the most complicated and diverse systems next to the rainforests of Brazil ("A Complex Prairie Ecosystem."). The tallgrass prairie is down to only 1% of its previous capacity and as a result exists as one of the most rare and endangered ecosystems in the world ("A Complex Prairie Ecosystem."). Indiana specifically was made up of 15% prairies pre-settlement days ("A Complex Prairie Ecosystem."). The overall statistics are startling; it is worth taking an in-depth look at what prairies are left, specifically the Tallgrass Prairie Reserve and the Hoosier Prairie, and the efforts that are being done to restore them.

The Hoosier Prairie is a 1,547 acre area in Northwest Indiana which originally started as

a 304 acre restoration in 1977 when it was designated as a State Nature Preserve. It mainly consists of sandy soils and boasts 350 native species of plants (“Hoosier Prairie.”). This site is a good example of a small scale project that has slowly progressed into a larger project year after year. The Tallgrass Prairie National Park will likely need to follow a similar pattern. Also, because there are a lot of sandy soils on site, many plants from the Hoosier Prairie will be suitable for the Tallgrass Prairie National Park. It would be unlikely that all 125 square miles could be acquired instantly. It would be a long process of acquiring land so the national park project should be split up into different phases to make it more feasible for design sake and obtaining funding.

A much larger prairie is the Tallgrass Prairie Reserve. The Tallgrass Prairie Reserve spans nearly 40,000 acres and lies near Pawhuska, Oklahoma making it the largest protected area of tallgrass prairie on Earth (“Tallgrass Prairie Preserve.”). The Nature Conservancy bought the land in 1989 and returned fires and bison to the prairie which has helped a lot of the native vegetation return (“Oklahoma Tallgrass Prairie Preserve.”). The project is owned by the Nature Conservancy , as is the Hoosier Prairie. The preserve only serves people by offering a scenic drive; this approach is where this large project differs from the Tallgrass Prairie National Park. The new park will create a destination with drives, trails, facilities, and other amenities. The problem with the Tallgrass Prairie Reserve is that it doesn’t require you to get out of your car. However, it will be helpful to look at how the Tallgrass Prairie Reserve is organized because of its large size. Moreover, the Nature Conservancy will serve to assist with development of the park because of their wide experience with various prairie reserves across the nation.

For the Tallgrass Prairie National Park there will need to be a direct link to the historical significance of prairies. Many prairie plants have been used in the past for medical purposes. Some people have even researched prairie plants as a way to cure cancer and other terminal diseases. The new park could feature a research station that is associated with nearby Purdue University and Eli Lily. Before the prairies were decimated, Native Americans used them for a source of medicine and food. Prairie Smoke was used for an eye wash, gargle for sore throat, and also as a tonic for stomach and menstrual pains (Mahr). Another prominent plant in the prairie is the Purple Coneflower. Medical professionals all around the world praise it for its multiple uses. Several studies suggest that the substances in the coneflower enhance the activity of the immune system, lessen pain, reduce inflammation, and also have antiviral, antioxidant effects; therefore, it has been used to treat urinary tract infections, ear infections, hay fever, and some studies even suggest the prevention of the cold (“Echinacea.”). There are many other plants in addition to these prairie plants that provide medicinal uses. The prairie is a living pharmacy that needs to be utilized once again. The research stations could manage the distribution of the medicinal plants and look for new uses of other plants. Visitors could come and learn about the research process and how the prairies were significant for previous inhabitants of the United States.

Another tactic of how the new park will reflect the historical significance of prairies is by encouraging the return of endangered species. Many different plants and animals have nearly gone extinct without the tallgrass prairies. The current Kankakee Sands project in western Indiana, which has restored nearly 22,000 acres, is seeing the return of endangered species. The Henslow’s sparrow population has been increasing an impressive amount in the restored prairies. A study in 2008 revealed that there were over 300 pairs of sparrows in the

area (“Kankakee Sands Efroymson Family Prairie Restoration.”). Endangered species will be tracked within the new park and measured to see how their populations are increasing. Education in the park can teach visitors about endangered species and how the tallgrass prairie was an essential habitat for many species.

The tallgrass prairie is not what it used to be. However, with other restoration efforts and the creation of the Tallgrass Prairie National Park, the prairie will make a resurgence. The prairies have always been historically significant because of their medicinal purposes and crucial habitats for endangered species. The addition of research stations connected with Purdue University and Eli Lily will provide an opportunity to further develop the use of prairie plants for human kind. Furthermore, endangered species will be promoted with restored habitat. The public will be able to learn about both of these efforts while on site. The park will continue the legacy of the tallgrass prairie.

Prairie Restoration Techniques

Even though it has become prevalent in the past ten years, prairie restoration projects have been occurring for decades. In 1935 the first tallgrass prairie restoration project began with the Curtis Prairie located in Madison, Wisconsin (Rowe 253). Since then many different approaches have been tried and tested. Restoration Ecology conducted a survey of thirty-eight experts in tallgrass restoration to discover techniques found to be the most effective. The Tallgrass Restoration Handbook offers different viewpoints to those gathered from the survey, making for a good comparison between the two. It is also essential to look at the project at Fermilab in Batavia, Illinois where there is a large-scale case study to compare techniques for the new national park.

The tallgrass restoration survey covers all different parts of restoration. The first part of the survey covered seeding. It is important to understand that seeded restorations have two basic categories: reconstruction and remnant restoration (Rowe 254). Rowe writes that, “Reconstruction involves row cropping a field for 2–3 years, usually with corn Zea mays or soybeans Glycine max, before beginning restoration with native seed. Remnant restoration involves adding seed to a low diversity prairie and is used in combination with various site preparation methods such as burning, mowing, tilling, or herbicide application, depending on the existing plant community composition” (Rowe 254). Both techniques are used in the field, but the survey determined that reconstruction is more common and successful (Rowe 259). The reason reconstruction was preferred was because it typically involves a two to three year period where there is corn or soybean grown on the fields; therefore, the lease period provides revenue and covers cost of the site preparation (Rowe 259). The Tallgrass Restoration Handbook also advises restoration on an existing agricultural field. The agricultural field will have much less weeds in it than a remnant restoration, but will still require some management. Tilling should be done only two inches deep because going any deeper would bring weed seeds to the surface. Packard and Mutel write about the necessity of packing the soil, where Rowe doesn’t mention the importance in the survey. A soil that is well packed will eradicate air passages that would cause the new seeds to dry out and die before it breaks the surface. Furthermore, the packed soil will have a light crust on the top, which would help keep moisture in (Packard and Mutel 194).

When looking at which field is best during reconstruction it is best to use soybean versus corn because soybeans do not leave furrows or residue that impede broadcasted seeds

from contacting the soil (Rowe 259). Soybeans also form a layer of residue, which helps prairie seeds to bind (Rowe 259). A remnant restoration would be best if tilling is not possible or a site is challenging because the existing vegetation out competes seedlings for above and below ground resources (Rowe 259). A remnant restoration would also be necessary if there were an area, like an oak savanna, with existing tree roots that could be damaged by plowing (Packard and Mutel 40). For the new park a combination of these methods would be best, which is common. In the land investigated for the park, there are many farm fields, which would easily become soybean crops for preparation purposes, but at the same time also some sites are already in the process of being restored.

Furthermore, broadcast seeding with a local ecotype that is a high diversity forb-dominated species mix is preferred over drilling, because it gives a more naturalized look according to Rowe. However, Packard and Mutel recommend using a native seed drill instead of broadcast seeding because it is more effective, but costly. Broadcast seeding is easier and cheaper, but it requires more seed and is less effective (Packard and Mutel 214). The handbook also says that packing the soil occurs before drilling, but always after broadcast seeding (Packard and Mutel 214). The survey recommends doing a broadcast seed in the dormant season with fires and mowing during the first few years (Rowe 261). The native seed drill should occur immediately after the last cultivation and roller packing. Typically it is done in season with good rain, late spring or early summer (Packard and Mutel 209).

The Tallgrass Prairie National Park should include both seeding methods. In the beginning stages of the park it will be necessary to do drilling to ensure prairies get established quickly. Park visitors will want to see a prairie once the park is opened, so it will be good to have quick results, but broadcast seeding could occur in later phases of the park because it costs less. Both sources make a good argument for their methods, it seems that the survey revealed actual practices, which were dictated by budgetary restrains. The handbook offers advice from a stronger research background, so it will recommend the most effective approach, not limited by a budget.

When managing the field, fire is most often used but grazing is effective as well; moreover, mowing is a good tool as well and is more often used in the first few years (Rowe 261). The prescribed fires occur typically in fall or spring (Packard and Mutel 245). These results directly inform good strategies for the management plan of the future park. It will be difficult to always have controlled burns so there will have to be a combination of mowing and fires. Bison were originally native to Indiana, so their management might be considered as well.

Fermilab, located in Batavia, Illinois, is a large scale case study within one hundred miles of the Tallgrass Prairie National Park. Fermilab is the National Accelerator Laboratory run by the US Department of Energy (Mlot 804). Robert F. Betz, a professor from Northeastern Illinois University who has a large amount of experience with prairies, discovered the potential for a prairie on the Fermilab site in the 1970's. In the autumn of 1974, Betz and a group of advocates began the process of restoring 1000 acres of prairie to the site. They began by collecting seeds from 70 species of prairie plants within 50 miles of the site to work with local ecotypes (Mlot 805). The seeds were collected from nearby so the plants would be appropriate for the region and local wildlife would be able to pollinate the plants. Next they kept the plants moist after cleaning and cooling them to help break the dormancy period. Instead of doing a broadcast seeding like the article from Restoration Ecology recommended,

the Fermilab project mechanically drilled the seeds into a ten acre site that had been plowed and disked. They initially had a lot of trouble with weeds, but the prairie plants eventually started to establish themselves (Mlot 805). It is possible that they were too vigorous with their drilling and brought too many seed to the surface, which was advised against in the Tallgrass Prairie Restoration Handbook. It took about four years for enough biomass to build up for a controlled burn; therefore, they planted heartier species, like Big Bluestem and Indian grass, before planting weaker plants such as Purple Prairie Clover. Betz observed over the years that the native prairie plants have pushed out the invasive species and that animal species have returned to the site (Mlot 806). The idea of collecting native seeds would be extremely advantageous for the future park because of the benefits for the ecosystem and it would incorporate the surrounding community into the park. They also started to collect seeds at Fermilab, but they were careful to collect seeds from other prairies as well to keep a high genetic diversity (Mlot 806). Having a local nursery on site would be extremely beneficial for the new park. The nursery could collect seeds across the site and go through the procedure of processing them for seeding. This nursery could also be the area where seeds are stored from neighboring sites for use at the park.

Restoration is a major part of the creation of the new park. Prairie restorations are starting to occur more often across the United States and the methods are only improving. There are benefits and drawbacks for each of the different methods. The Tallgrass Prairie National Park will be restoring a combination of agricultural sites and remnant sites. It will be best to start with drilling the seeds for the more effective result but then transfer to broadcast seeding once the prairies are established for the first phases of the project. Fire will be used often to manage and maintain the prairies, along with bison as an experimental management device. In another decade the best approach might change again and the park will have to adapt to the new methods.

Biodiversity of Prairies/Kankakee Sands Project

The biodiversity of prairies is essential for the improvement of the overall environment. Prairies make up the largest vegetative province in North America (Samson and Knopf 418). Preventing the further decline of the prairie is essential because of its significant ecological features and value to the human population. Different professionals offer a few different approaches how to achieve and maintain biodiversity. One solution comes from the current Kankakee Sands project. Kankakee Sands will also be investigated to learn how it can be integrated into the Tallgrass Prairie National Park.

The first idea offered by Fred Samson and Fritz Knopf, research ecologist and scientist, is an over-arching solution. They state that the first problem with addressing biodiversity loss is bringing public awareness about the situation. They call for a reorientation of environmental concern to move from a focus on forest ecology systems to prairies (Samson and Knopf 420). The next step they list that would be applicable to the Tallgrass Prairie National Park would be to evaluate the status of candidate threatened or endangered species and then boost conservation measures of those prairie species (Samson and Knopf 420). The way that could be applied in the park would be to encourage the dispersal of those endangered species either by seed or drill. A good practice would be to designate certain areas of the prairies as nurseries for endangered species and require a higher intensity of maintenance and invasive removal. Additionally, the awareness of the biodiversity of prairies will be achieved through

educational programs in the park and tie in with interpretative signage/centers that will be located throughout the park.

Another solution looks at the specific process of restoring a prairie and how genetics can improve diversity. The Kankakee Sands Efroymson Prairie Restoration is currently taking place in Newton County, Indiana. There was a study done on genetic variation of the restored prairies compared to nearby remnant prairies. The reason why genetics play a role in prairie biodiversity is that plant genetic diversity enhances arthropod diversity and increases annual net productivity (Dolan, Marr, and Schnabel 386). Gathering plants from different sources achieves genetic diversity, whereas if it were from one source then populations would be genetically impoverished and possibly suffer from inbreeding or genetic drift (Dolan, Marr, and Schnabel 387). The Kankakee Sands Project collected seeds from 125 different remnant sites, averaging five sites per species to have the most effect on genetic diversity. The results found that they have been successful so far at representing the genetic patterns of the area (Dolan, Marr, and Schnabel 394). The site features an on site nursery for the seed collection similar to the project at Fermilab, featured in the Restoring the Prairie article. Therefore, either enlarging the nursery at Kankakee or adding another one at the Tallgrass Prairie National park will be necessary. It will improve the overall biodiversity of the prairie and help keep the project local.

It is also crucial to further investigate the Kankakee Sands project to discover other practices or features that could be featured in the future park. The 20,000 acre project is returning farmland to its historical state of wetlands, sand prairie, and Black Oak Savannas (Dolan 386). Their goal is to increase wildlife and mitigate the effects of fragmentation by increasing connectivity between fragments. They have also begun returning the area to its natural hydrology by removing drainage tiles and ditches (Dolan, Marr, and Schnabel 387). The Tallgrass Prairie National Park will work in phases restoring prairies from farmland and connecting remnants, which will help to mitigate fragmentation. It will be important to return the rest of the area to its original hydrology as well. The current Kankakee Sands project features land that is both owned by The Nature Conservancy and Indiana. Parts of the land feature Conrad Savanna, Beaver Lake Nature Preserve and the Willow Slough Fish and Wildlife Area (Dolan, Marr, and Schnabel 387). The Tallgrass Prairie National Park would obtain all of those lands and become federal land. It will not be worth investing in any land far east of the Kankakee Sands because that will be out of the range of the historic locations of Tallgrass prairies.

Conclusion

After researching and analyzing many different sources, conclusions were formed that will help create a successful comprehensive project. The creation of one village, with potential for more, within the Tallgrass Prairie National Park will serve the public by focusing many different facilities in centralized locations, specifically interpretative centers and lodging. A national park also necessitates facilities such as campgrounds, roads, trails, and gateways. These all should be blended into the landscape and have as little impact as possible. The design aesthetic of the park should originate from naturalized, picturesque design. The modern design from Mission 66 should not be used for its architectural styles, but the impactful visitor center will be featured multiple times throughout the park. LEED and SSI will both be crucial parts in the design of the park to ensure it reaches high standards of sustainability.

Prairies are a crucial part of American and Indiana history. There are lasting remnants that are slowly being restored. Prairies are historically significant because of their medicinal uses and home to endangered species. The new park will further develop medicinal uses of prairie plants and feature research stations from Purdue University and Eli Lily. It will also encourage the return of the threatened species.

Looking at restoration, prairies should be restored after a soybean crop using a broadseed method after they have initially been established with a native seed drill. Sites require specific attention before seeding occurs to eradicate weeds and prepare the soil. Fires and mowing are applicable management methods that will both help to bring a prairie to its full potential. Bison will be used as experimental management. The biodiversity of the prairie has to be addressed at theoretical and site related levels. Raising awareness within the park with educational tools will spur a bigger movement in the nation, but increasing genetic diversity by gathering local seed will increase and maintain biodiversity within the park. The Kankakee Sands Project already features remnant prairies within its 20,000 acres, which will serve as a significant starting point for the new park. Goals and features of the project will continue into the creation of the park as well.

The Problem and Significance

A) Problem Statement

This project focuses on restoring nearly 80,000 acres of tallgrass prairies by creating the Tallgrass Prairie National Park in Newton County, Indiana. The 125 square mile park begins where the Kankakee Sands project ended. One purpose of the new park is to inform the public and professionals about prairie restoration techniques and the importance of the tallgrass prairie. That purpose, along with relaying the historical significance of the tallgrass prairie and educating the public, makes the park a national destination. The park also aims to restore biodiversity to what was a largely agricultural landscape. A regional plan of the entire park and a master plan of the village are the deliverables.

B) Hypothesis and Sub-Problems

By restoring tall grass prairie and creating a National park, biodiversity can be restored to the region; furthermore, the park could stand as an educational component for both professionals and the public because of the restoration and featured facilities.

- Sub-Problem #1: What are the key features and facilities necessary for the development of a successful national park that will focus on educating visitors about tall grass prairies?
  - **A series of roads and trails are integrated through the park to provide access. Furthermore, important buildings, such as a visitor center, lodge, and research center, are incorporated into the plan to successfully educate and satisfy visitors.**
- Sub-Problem #2: How can the park reflect the historical significance of prairies in Indiana and the rest of the United States?
  - **The park acts as an example of what the prairies used to be while at the same time providing educational components, such as signs and a visitor center to inform the public.**
- Sub-Problem #3: What are the most suitable restoration techniques of prairies for the proposed park?
  - **The most suitable restoration technique for the park is broadseed methods versus using plugs.**
- Sub-Problem #4: What steps are necessary in a prairie restoration that will encourage and maintain the level of biodiversity typical of tall grass prairies?
  - **The prairie restoration is careful with its seed source to keep in tune with local needs of the wildlife and keep a good genetic diversity.**
- Sub-Problem #5: How can the Kankakee Sands Projects be integrated into the plan for a national park that focuses on tall grass prairie landscapes?
  - **The existing restoration projects and protected lands are incorporated into the larger master plan and connected via paths and stopping points.**

C) Definitions

Biodiversity: a theory based around the idea that diversity of plants and animals provide for the best ecosystem.
Broadcast Seeding: a method of seeding that involves a device that spreads the seed out across a broad area.
Ecotype: an organism from a specific ecosystem.
Facilities: a series of buildings or infrastructure that can provide services such as transportation, entertainment, education, sanitary means, and lodging.
Fallow Fields: a type of agricultural field that is left to return to its natural state after being cultivated.
Gateways: structures that signify an entrance to a certain space with signage and material.
Interpretative Center: a building and its site that provide an engaging and learning experience for users.
Kankakee Sands: a project funded by The Nature Conservancy that aims to restore the tall grass prairie of Indiana and Illinois.
LEED: a program that sets up standards for a complete sustainable process of planning and creating a building and site.
Naturalized Swale: a vegetated space that cleans a landscape through natural means.
Restoration: a process of attempting to return an ecosystem as close as possible to its original state before alteration.
SSI: a program that sets up recommendations for an overall sustainable design process that addresses site selection, pre-design assessment and planning, various site design principles, construction, operations, maintenance, and monitoring and innovation.
Tall grass prairie: an ecosystem that primarily consists of grasses and forbs that has been historically located in central North America.
The Nature Conservancy: a non-profit organization focused on conservation that acts around the world.

D) Assumptions

- The farmers sold their land for the project.
- There was sufficient funds for the project.
- It was feasible to create an entire national park.

E) Delimitations

- The project did not specifically work with The Nature Conservancy and Kankakee Sands, but partners were consulted.
- The regional plan showed the first phase of the project and was conceptual because of its scale.
- The project did not get into the details of funding.
- The architectural styles were not fully developed, but an overall theme was be established.

F) Significance

Tallgrass prairies are becoming extinct. Approximately 15% of Indiana used to be covered by tallgrass prairie and now they are nearly non-existent. By creating a park that restores a vast amount of prairie, Indiana could begin to work towards restoring the previous 15%. Also the restoration could help promote the return of prairies to the greater Midwest.

Prairies are extremely important because they filter out toxins in the landscape and provide habitat for thousands of species of plants and animals. Biodiversity has been decimated by the agricultural landscape and the return of prairies would encourage species to return. Furthermore, pollinators, such as bees, would be more abundant as well, which would help crop productivity. Medicinal uses have been developed in the past from prairies. The new park would develop more uses from prairie plants for humans. People and the environment would both benefit.

Movements across the country have already begun to restore prairies, such as the Tall Grass Prairie Preserve in Oklahoma, which covers 39,000 acres. The preserve offers people the opportunity to drive though the prairies, but it doesn't offer an intimate experience. The installment of the national park increases the amount of prairies in the Midwest and offers full engagement to the users.

There haven't been any significant national parks created, such as Yosemite or Yellowstone, in decades. The Tallgrass Prairie National Park would become the largest tallgrass prairie unit in the National Park Service. Moreover, it was designed in order to draw in crowds from across the country. By being designated a national park, it gains prominence and helps spread the word about the restoration of tallgrass prairies. It also helps return the private landscape of America back to the hands of the public.

Project Requirements

TPNP

A) Design Goals and Objectives

The mission of this project is to create a national park that focuses on restoring tallgrass prairies. The project is intended to be completed in multiple phases to achieve nearly 80,000 acres of prairie. The restoration aims to bring back the prairie to its historical state. Kankakee Sands restoration is incorporated into the park. The park engages the visitors in several natural environments, which will be improved once fragmentation is eliminated in the region. Furthermore, facilities provide lodging and education in the park for the visitors. The following goals and objectives were developed for the park:

- Goal 1: Educate the public and professionals about prairie restoration techniques.
  - Objective 1: Feature multiple methods of restoring a prairie, such as drilling vs. seeding.
  - Objective 2: Incorporate an interpretative center/visitor center in the park.
  - Objective 3: Provide different interactive programs for visitors.
- Goal 2: Relay the importance of the tallgrass prairie and its historical significance.
  - Objective 1: Feature multiple facilities on site, which will educate the public, such as a visitor center and research center.
  - Objective 2: Serve as a representative example of historical prairie communities.
  - Objective 3: Develop research stations that focus on the historical uses of prairies, medicine and species habitat for example.
- Goal 3: Restore the biodiversity to the region.
  - Objective 1: Encourage genetic diversity in the prairie, which could be done with local seed selection.
  - Objective 2: Reverse the mono-culture of the agricultural landscape and restore natural systems.
- Goal 4: Become a national destination.
  - Objective 1: Establish the park as the largest Tallgrass Prairie unit under the National Park Service.
  - Objective 2: Develop a park that draws in visitors with its various amenities and lush restoration.

B) Site Issues

After creating the goals and objectives, it is necessary to address some of the issues regarding development of the site. A description of the site more in depth comes later in the report. However, it is important to establish four challenges of the site.

- Poor Access
  - The site is not located near any major city, so there are some issues of access. However, interstate 65 is to the east of the site and provides a source of entry. It is important to create a destination that was worthwhile enough to draw in visitors from Chicago and Indianapolis.
- Management
  - The park itself is quite large and will be difficult to manage. However, the most difficult task will be effectively managing the prairies and keeping out invasive plants. Burning the prairies will do a great job, but fires won't always be possible so human control with herbicides and other methods will be necessary.
- Creating a National Park Comparable to Yellowstone
  - The lack of mountains and other remarkable landscapes was a challenge for the park. It required designing a park that would entertain and inspire visitors with a flatter landscape compare to the mountains. However, the prairie could offer an extreme abundance of plants and animals. The design required the use of many trails and overlooks. The design needed to encourage visitors to find a new appreciation of the landscape.
- Ecological Conditions
  - The condition of the landscape was modified from its original state. Therefore, it was hard to sometimes determine the best approach for restoration. The system of drainage tiles and ditches altered the entire condition of the hydrology. Stream restoration and overall hydrological restoration would be a slow process. Furthermore, wetlands occur in the area naturally as well so mapping had to be done to propose prairie in appropriate areas.

C) Clients/Users

The Tallgrass Prairie National Park will draw in a wide variety of users. Newton County itself will provide a continuous amount of visitors to the site, but people from all around the Midwest will raise the attendance of the park. Chicago and Indianapolis will serve as hubs for incoming tourists from all around the country. Specific groups, such as Boy/Girl Scouts and school groups, will also be important visitors to the site because of the outdoor classrooms located within the park. The cabins and the lodges will pull in visitors who are looking to spend more time on the site.

The potential employees of the park will come from nearby towns, such as Morocco, but will increase to include people from Indiana and Illinois. The installation of the park will have to work in conjunction with The Nature Conservancy and their efforts on the Kankakee Sands Restoration.

Program

TPNP

The program developed for this project aims at achieving certain goals in a variety of scales. There are overarching goals that apply to the entire project. Then there are also specific goals for each design. Many different factors went into the creation of the design program, such as case studies and background research. These parameters provided the criteria for subsequent designs.

A) Overall

- Bring back the tallgrass prairie to its historical state
- Begin in Newton County
  - Continue the efforts of Kankakee Sands
  - Less likely for woods species to infiltrate
  - Appropriate soils for prairie establishment (Gt)
- Expand into greater Grand Prairie region in future phases
- Restore biodiversity to the region
- Display prairie restoration techniques
- Relay the importance of the tallgrass prairie
  - Professionals
  - Public

B) National Park (Regional Plan)

- Encompass restored prairies and savannas
- Create one village that serves the whole park
- Feature a pedestrian and equestrian trail
- Establish one campground that meets the needs of pedestrian user and horse owners

C) Village (Master Plan)

- Feature a interpretative center, lodge, research facility, restaurant, and cabins
- Integrate the prairie and architecture appropriately
- Feature outdoor classrooms
  - Boy Scout and school group use
- Feature various management techniques for the prairies around the village, and provide access for research and education purposes
- Feature ditch restoration and wetland establishment

Design Process

TPNP

Location

The site chosen is located in Newton County, Indiana. The acreage is roughly 80,000 acres. Chicago is 60 miles northwest of the site and Indianapolis is located about 100 miles to the southeast. A large agricultural region encompasses the site on all sides.

Many different roads run though the site because of its size. Most of them are smaller county roads. To the west lies State Road 41, which is the largest road within the site. To the far east lies Interstate 65. This will be the main connector to the site from various cities. IN 14 and IN 55 are other main roads that run through the site.

Within the site there are different properties owned by both the State of Indiana and The Nature Conservancy. The properties that are located within the Newton County are the Kankakee Sands Restoration, Beaver Lake Nature Preserve, Conrad Station Savanna, and Willow Slough Fish & Wildlife Area. Many of these areas were slowly being connected, but some are still quite separated from each other creating fragmentation. Within the 80,000 acres there are also about two-dozen residential properties. A few different commercial properties are located within the site. The city of Morocco is the only major development that is near the limits of the park. The town has a small population of 1,100 people.

The site features an array of vegetation. Besides the agricultural landscape, there are wetlands, forests, prairies, and lakes on the site. The site also features the endangered Black Oak Barrens. The prairie will be the most important factor on the site. According to the IDNR's Natural Regions Map, the region features the Kankakee Sands Section and the Grand Prairie Section, which host all the natural regions already mentioned. The Kankakee Sands is suitable for tallgrass Prairie placement. The hydrography has been extremely modified on the site. Canals and ditches surround the natural areas. The Willow Slough Fish & Wildlife Area features a large lake.

The importance of the site is derived from its history. Before settlement the land used to be covered by the prairies and wetlands. It is the only region in the Indiana where the tallgrass prairie used to exist naturally. The installation of the park marks the beginning of the original prairie landscape in the Midwestern and central plain states.

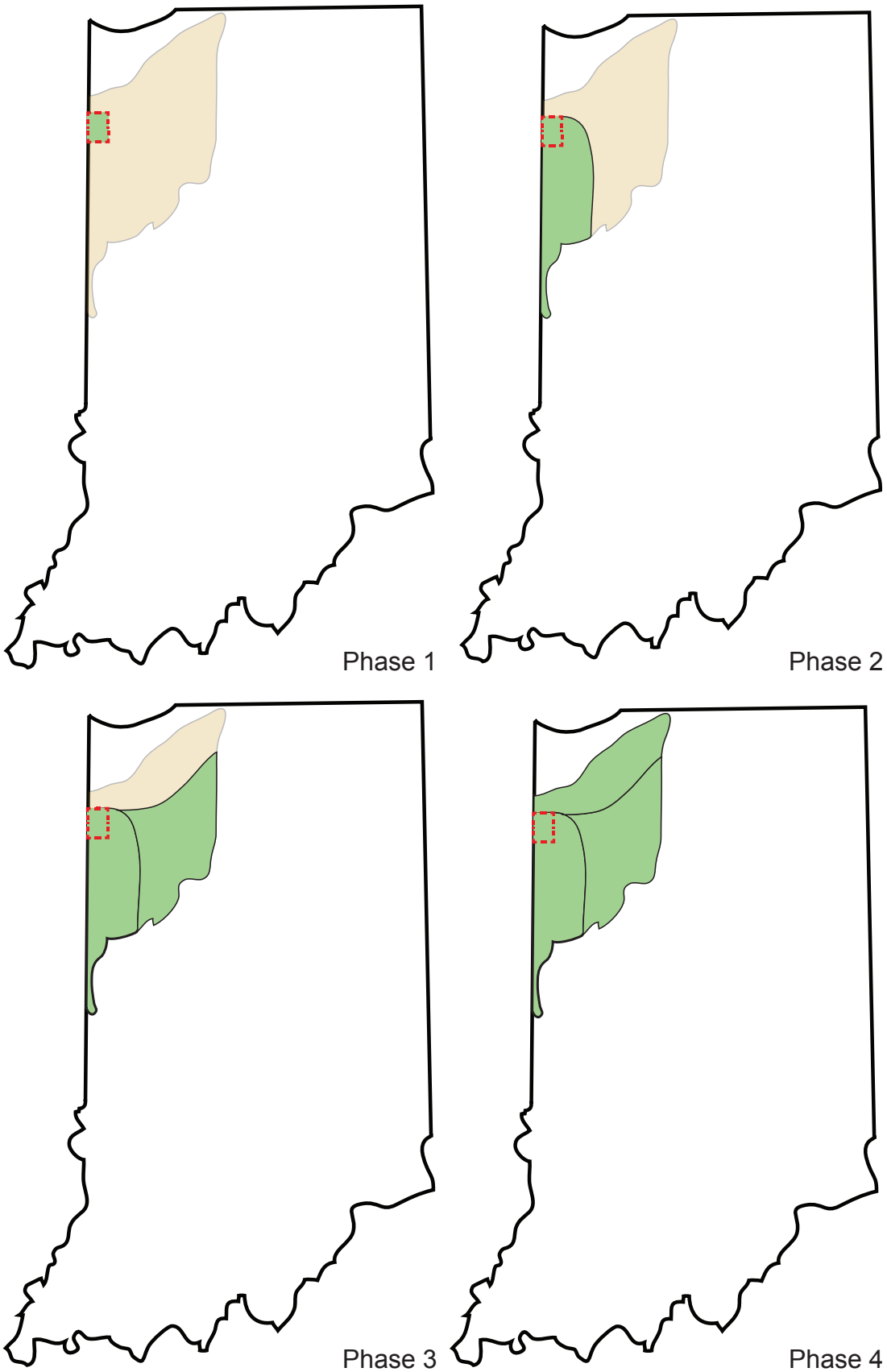


Fig. 1.1 Phased Development

Phased Development (Fig. 1.1.):
The national park will be created in multiple phases over the next couple decades. It will begin in Newton County and continue into the greater grand prairie region represented by the tan color.

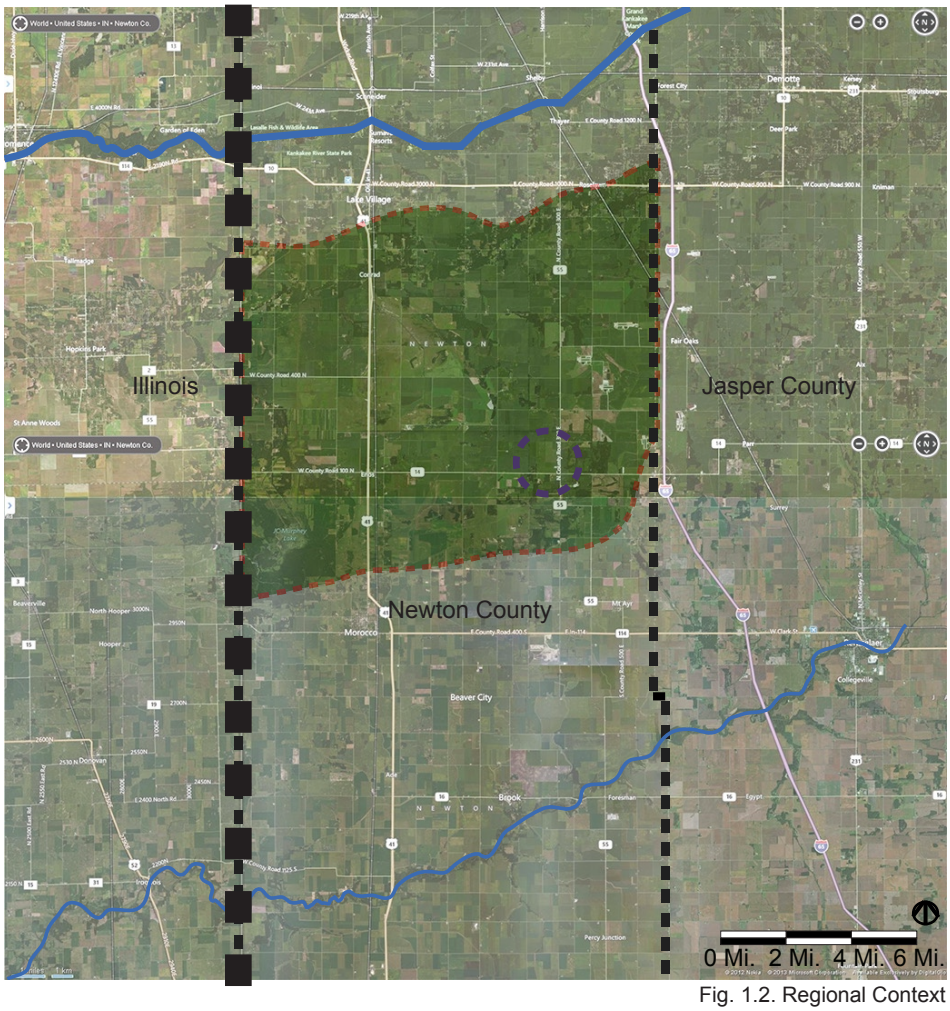


Fig. 1.2. Regional Context

Regional Context (Fig. 1.2.):
The 80,000 acre national park is located in Newton County, Indiana. Jasper County borders the site to the east and Illinois borders the site to the west.

Site Context (Fig. 1.3.):
The site for the village design is located in the southeastern corner of the national park. The 250acre site is bordered by IN 55 and IN 14.

Fig. 1.3. Site Context

Regional Inventory

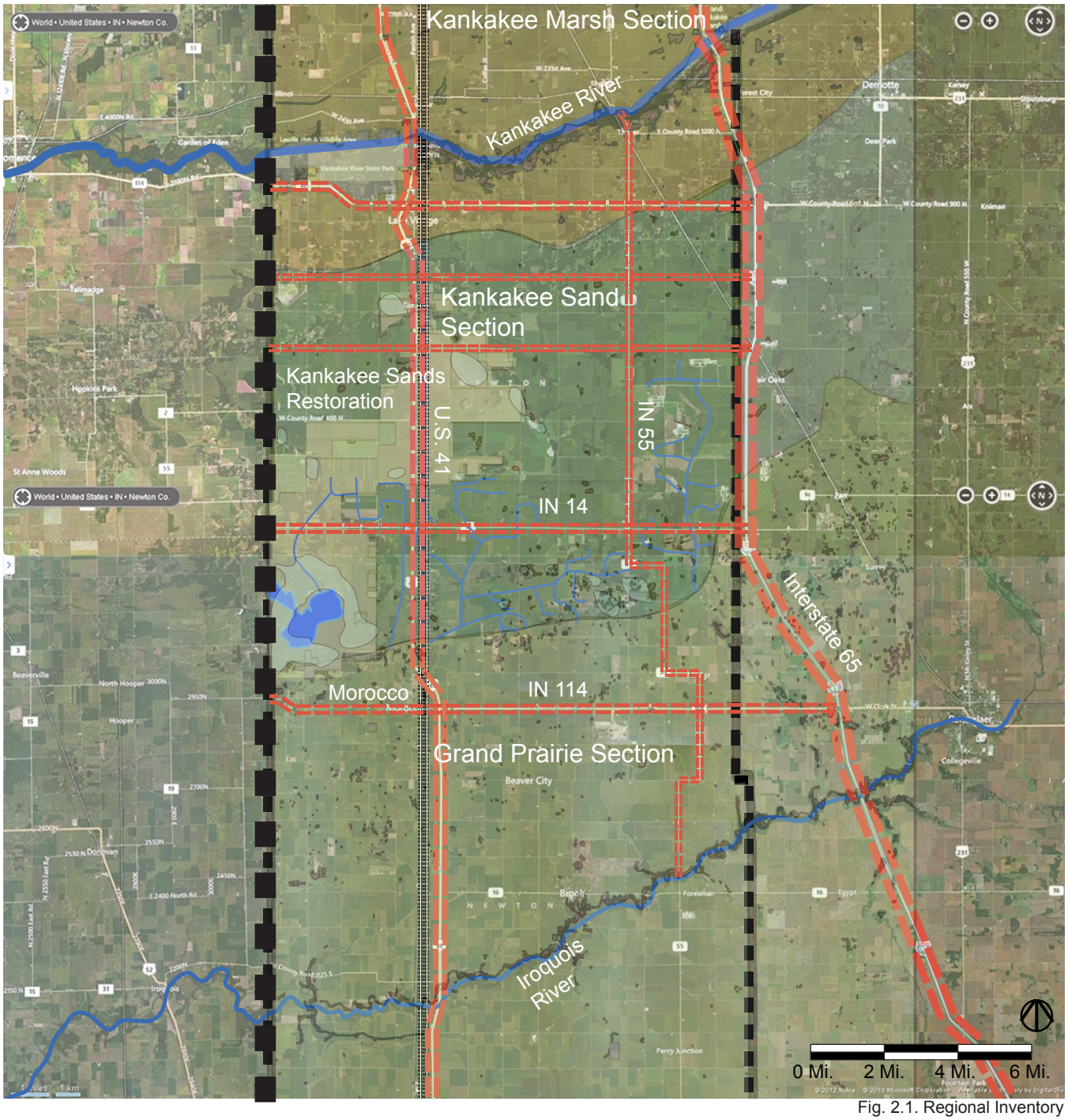


Fig. 2.1. Regional Inventory

The initial look at the site (Fig. 2.1.) revealed the large agricultural landscape. A larger look at the greater region on pre-settlement maps showed that historically the land was nearly covered with prairies and wetlands; therefore, a plan was developed to work towards that historical state. Newton County and the Kankakee Sands region determined the site parameters for the national park regional plan. This area was chosen because of the current restoration projects already going on in the area. Also, the Kankakee Sands region is very sandy, lending it to be harder for woody species to establish. The site is limited to Newton County for the first phase. It will expand into a greater area once more land is acquired.

Fig. 2.2. Abandoned Egyptian Line. Source: Panoramio

Fig. 2.3. Willow Slough Fish & Wildlife Area. Source: Panoramio

Fig. 2.4. Kankakee Sands. Source: Panoramio

Fig. 2.5. Kankakee Sands. Source: Panoramio

Site Photos:

Fig. 2.2. is the Abandoned Egyptian Line that runs from north to south on the site. It stretches quite a distance. Parts of the line are nearly overgrown with vegetation while others are still visible. Fig. 2.3. is the Willow Slough Fish & Wildlife Area. It is located in the southwestern corner of the site. There are already facilities which serve visitors to the site. Fig. 2.4. is part of the current restoration at Kankakee Sands. Some paths have been laid out for visitors to walk through the prairie, but there aren't permanent paths. Fig. 2.5. is similar to fig. 2.4. but includes one example of the structures on site.

Regional Analysis

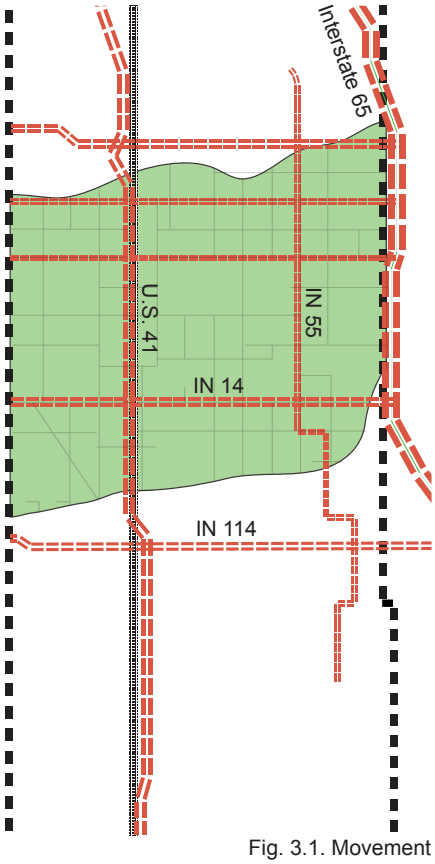


Fig. 3.1. Movement

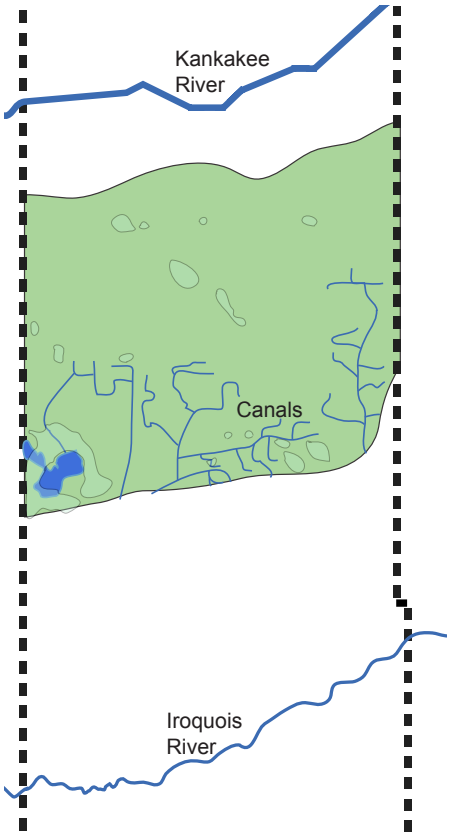


Fig. 3.2. Hydrological Functions

The movment diagram (Fig. 3.1.) shows the vast network of roads that cross the site. It was necessary to eliminate some minor roads and develop others into access roads.

The hydrological functions diagram (Fig. 3.2.) displays the hydrology patterns found on site. The canal system has modified natural hydrological patterns.

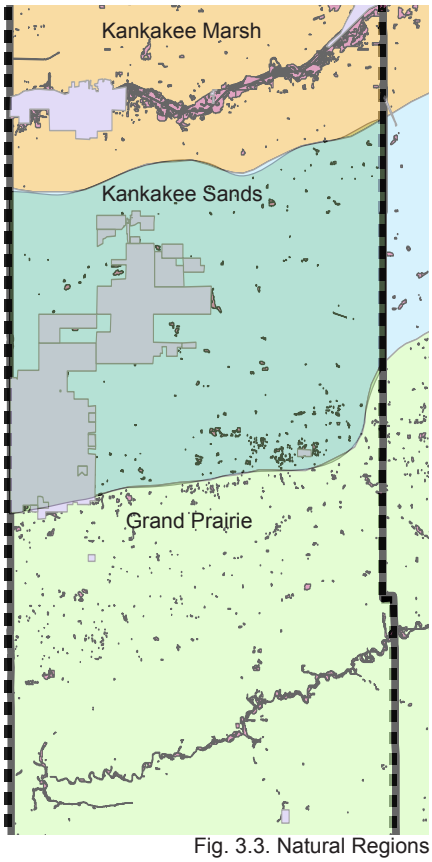


Fig. 3.3. Natural Regions

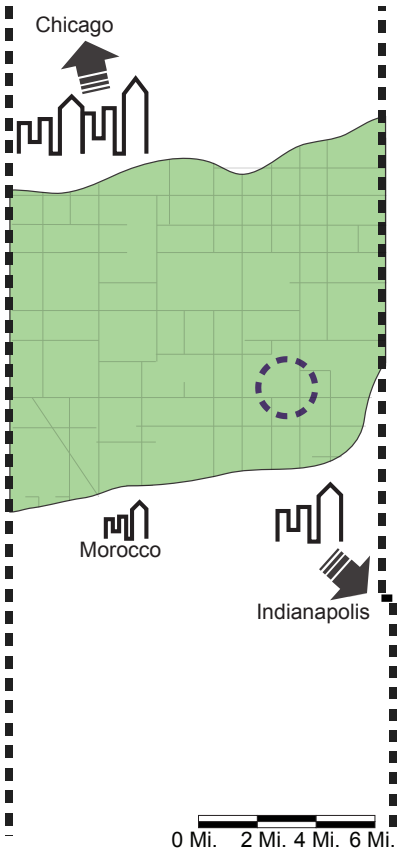


Fig. 3.4. Context

The GIS map natural regoins (Fig. 3.3.) represents the three natural regions found on site. The national park is located in Kankakee Sands Section because of its appropriate soils for prairie establishment.

The context diagram (Fig. 3.4.) displays cities in the region. Chicago is the biggest city nearby and will be the largest source of visitors.

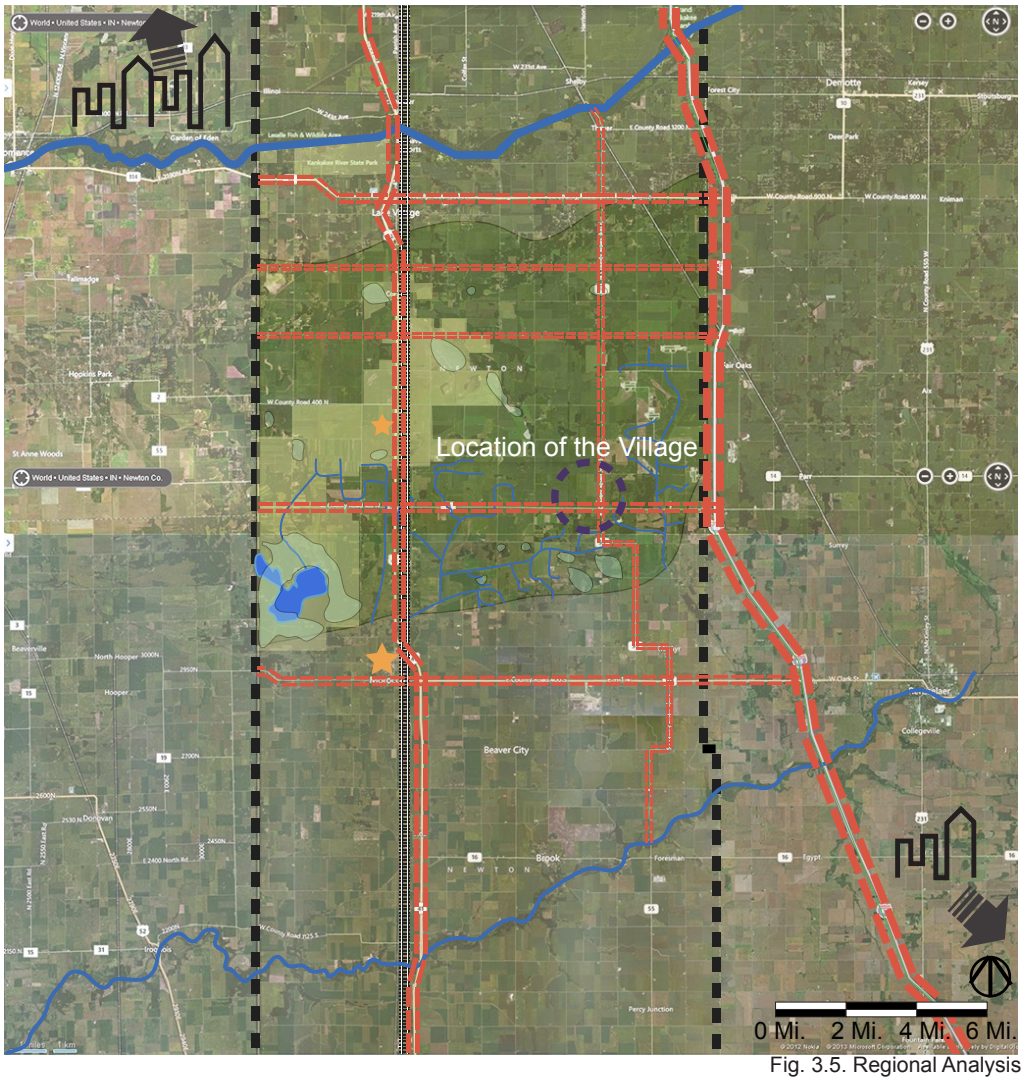


Fig. 3.5. Regional Analysis

Opportunities:
• Less likely for woody species to infiltrate because of sandy composition
• Appropriate soils for prairie establishment
• Near Chicago
• Along Interstate 65
• Current restoration already in progress
• Existing interest for national exposure

Constraints:
• Landscape dominated by the grid
• Degraded ecosystems
• Small local population

The analysis for the national park regional plan revealed that proposed paths needed to meander around existing vegetation and wetlands to preserve existing conditions. Then trails were determined by the locations of existing restoration projects. Existing roads would be changed into access roads or eliminated because access needed to be limited. Therefore, a master plan concept evolved that placed the location of the village were access was easiest, located a pedestrian path in the place of an abandoned railroad, placed the campground out of the wetlands and between pedestrian and equestrian users, and sited the paths for horses in the northwest away from other uses and not in swampy locations.

Case Studies

Great Basin National Park

- Location: White Pine County, Nevada, USA
- Nearest city: Ely, Baker, Border
- Area: 77,180 acres
- Visitors: 91,451 (in 2011)
- 2 Visitor Centers
- 4 Campgrounds

The Great Basin National Park (Fig. 4.1.) was a good comparison for scale, but does not pull in the amount of visitors intended for the Tallgrass Prairie National Park.

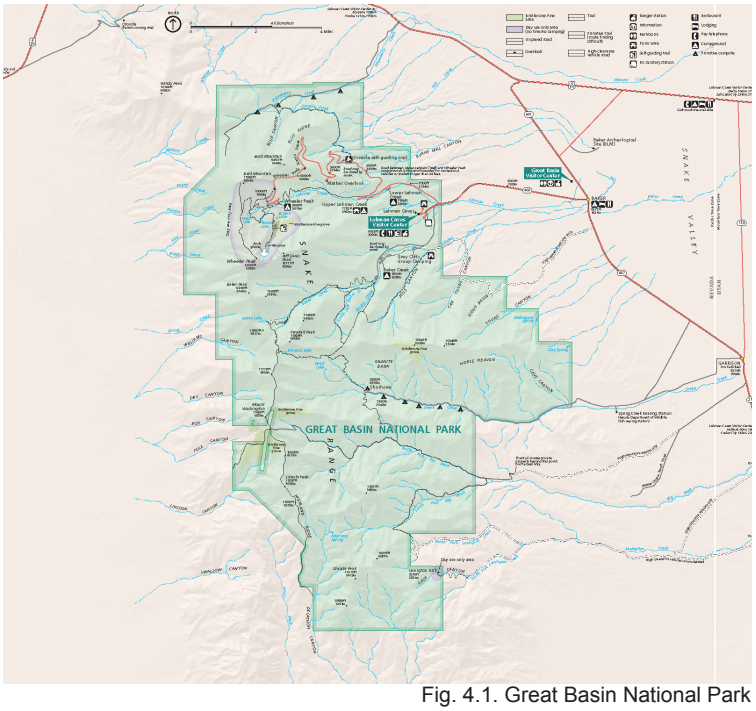


Fig. 4.1. Great Basin National Park

Arches National Park

- Location: Grand County, Utah, United States
- Nearest city: Moab, Utah
- Area: 76,679 acres
- Visitors: 1,040,758 (in 2011)
- 1 Visitor Center
- 1 Campground

The Arches National Park (Fig. 4.2.) draws in a larger crowd, which is closer to the amount that is intended for the Tallgrass Prairie National Park. Therefore, the parameters of 1 visitor center and 1 campground were used in the guidelines for the design of the national park.

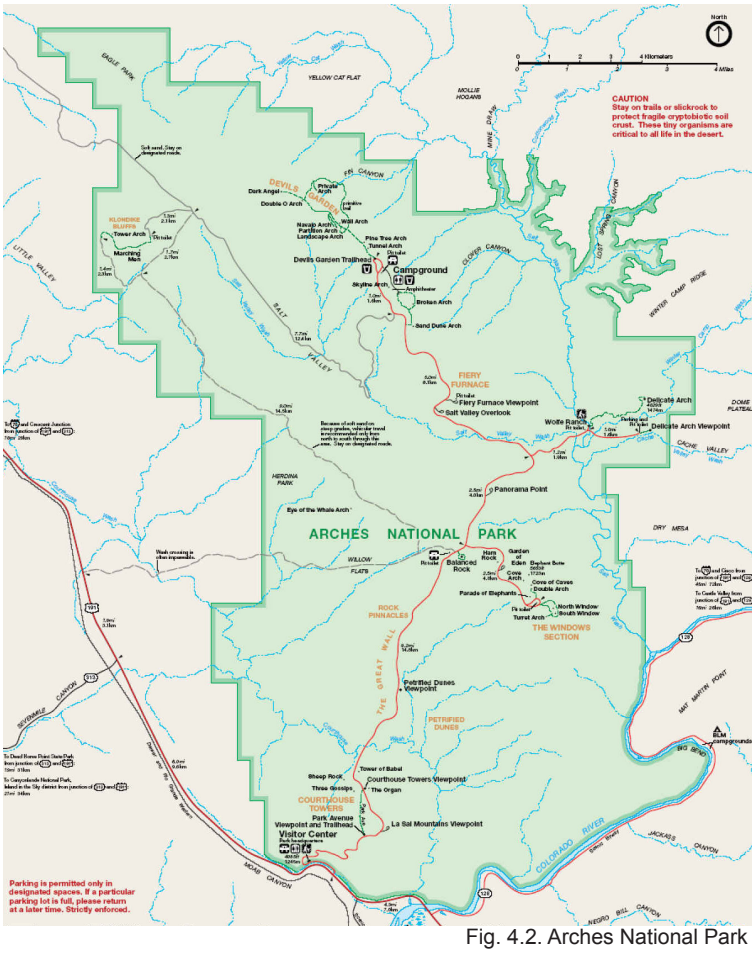


Fig. 4.2. Arches National Park

Tallgrass Prairie National Preserve

- Location: Flint Hills, Kansas, USA
- Nearest city: Strong City, Kansas
- Area: 10,894 acres
- Visitors: 17,615 (in 2005)
- 1 Visitor Center

This Tallgrass Prairie National Preserve (Fig. 4.3.) was a relevant example of the only grassland in the National Park Service, but it is small and lacks facilities.

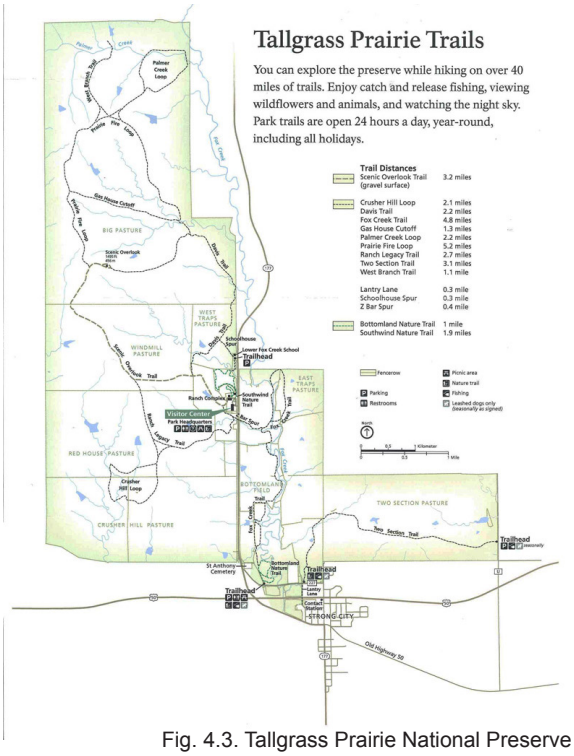


Fig. 4.3. Tallgrass Prairie National Preserve

Tallgrass Prairie Preserve

- Location: Foraker, Oklahoma, USA
- Nearest city: Pawhuska, Oklahoma
- Area: 45,000 acres
- Visitors: -
- 1 Visitor Center and Research Station

The Tallgrass Prairie Preserve (Fig. 4.4.) is the largest unit of tallgrass prairie in the United States. Since it is owned by the Nature Conservancy, it operates less like a national park would. The downfall of this case study is that users basically drive through the whole park versus experience an advanced trail network. The research center was used as a guideline in the creation of the Tallgrass Prairie National Park.

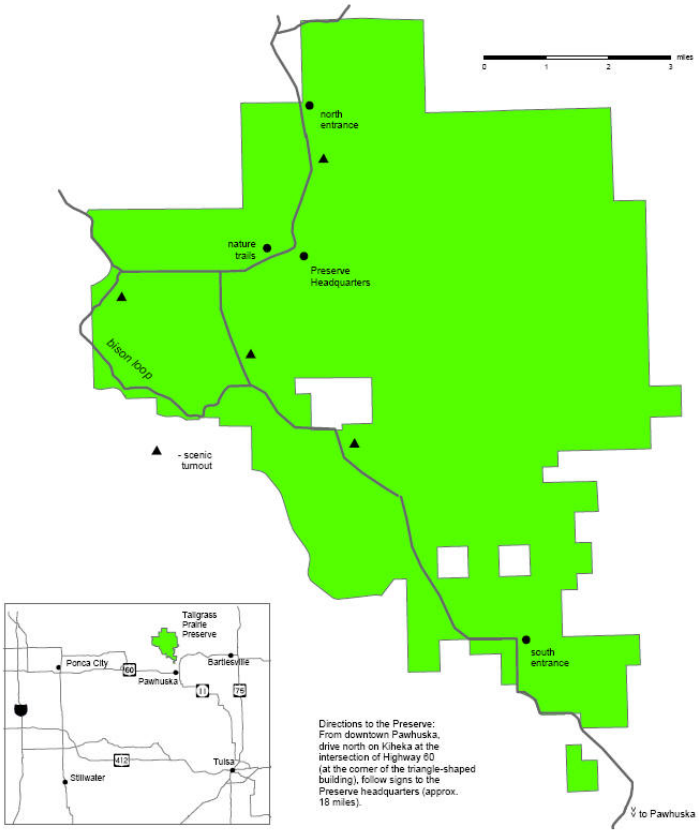


Fig. 4.4. Tallgrass Prairie Preserve

Regional Plan

Fig. 5.1. Regional Plan

1.

2.

3.

4.

Fig. 5.2. Activities

The design for the regional park was influenced by an immense amount of data. Two major trail networks were placed on site. The light green pattern represents the pedestrian trail network. This trail system was dictated by various natural features, such as the presence of wetlands and woodlands. The path moves organically through the park linking important locations in the park, such as the Conrad Station, Kankakee Sands Restoration, and the village site design. The second trail network, shown by the purple arrows, is an equestrian trail. This trial is located in the northwest corner away from wetlands. It is separated from the pedestrian trail so there are not any conflicts between bikers and horses. A campground serves both the pedestrian and equestrian trail. It is located away from the village in order to create a more secluded experience. A deeper network of trails exist in the design, but do not show up at this scale. The road network still follows the grid because as the park develops and land is restored, only then would the true hydrological patterns be revealed. After this occurs, there would be a reason for the road network to be formed around the landscape. Therefore, in later stages of the restoration the roads would start to mimic the landscape. Fig. 5.2. displays the various activities programmed on site and where they occur.

Site Inventory

Fig. 6.1. Site Inventory


Fig. 6.2. Site Inventory

The site for the village design (Fig. 6.1.) is covered by agricultural development. The parcel is owned by a large farmstead. This site was chosen because of its proximity to Interstate 65. It serves as a good entry to the greater national park. The landscape is flat and lacks biodiversity. Fig. 6.2. provides an overhead view of the existing conditions.

Site Analysis

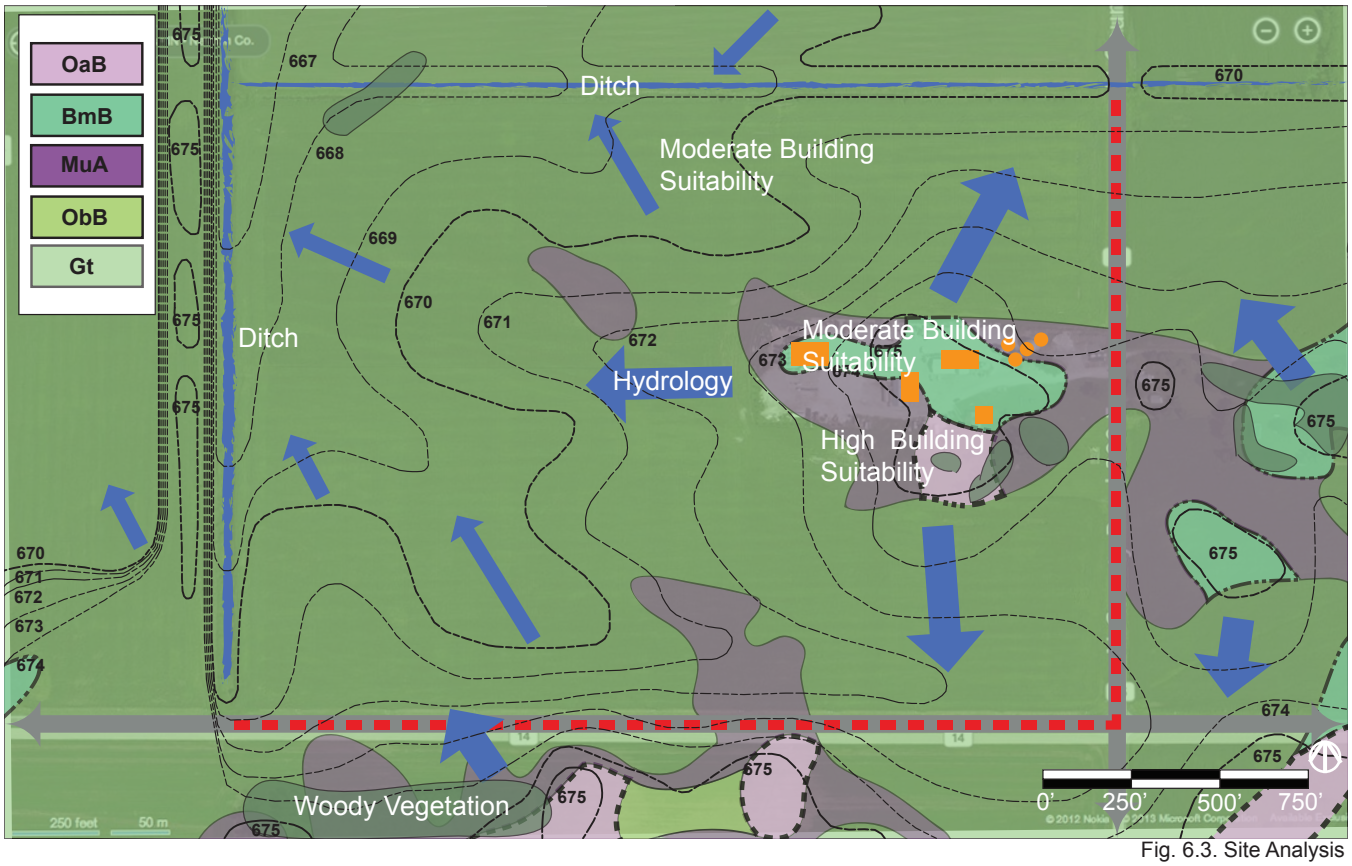


Fig. 6.3. Site Analysis

The analysis for the design of the village (Fig. 6.3.) divulged exciting opportunities. Soil mapping and topography maps helped determine the location where a majority of the development should occur. The light pink color, oaB soils, outlined by a dashed pattern, is the region where there is the highest suitability for buildings. Then the turquoise color, BmB, outlined by a dashed pattern as well, is a lower ranking for building suitability. The rest of the site has low suitability for building placement. Consequently, the village was located on the eastern edge of the site. The eastern edge also features the highest topography on site so the water would drain away from any development towards the northwest corner. A significant ditch occurs on site that arose for opportunity of stream restoration. The berm located to the west of the ditch provided an opportunity for a view across the site. However, it needed to be cut into to provide opportunity for stream meandering. A smaller ditch runs east to west, which was determined to become wetlands versus a stream. The corner of the two major roads, IN 14 and IN 55, has the most visibility on site. Therefore, the bison would be placed on the corner to draw in visitors. Since IN 14 receives higher traffic, it made sense to have the main entrance from that street. The dark purple regions of the map have the highest suitability for vegetation. This would provide opportunities to create viewsheds onto the site from the village.

Case Studies

Fig. 7.1. Turkey Run

Turkey Run Inn:

- 32,000 sf
- 70 rooms

Turkey Run (Fig. 7.1.) was chosen as a guideline for the development of the lodge because of its great success in Indiana.

Fig. 7.2. Arches National Park

Arches National Park Visitor Center:

- 21,000 sf

The Arches National Park (Fig. 7.2.) helped provide guidelines for the regional plan of the park. It also was chosen to be a guideline for the creation of the visitor center of the Tallgrass Prairie National Park because of the amount of visitors it accommodates.

Architectural Precedents

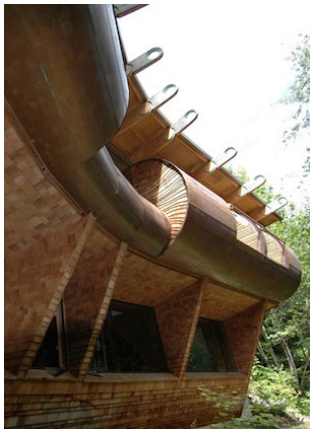


Fig. 8.1. Architectural Precedents

The provided images (Fig. 8.1.) represent the architectural styles of buildings constructed on site. The buildings in the images work to compliment the landscape they are located within. All of the buildings within the national park blend in with the prairie landscape. The research center features a roof that meets grade and has a prairie growing on the roof, similar to the bottom image to the left. However, it is important that the buildings aren't a modern statement, but a tribute to the historic national park design.

Concepts

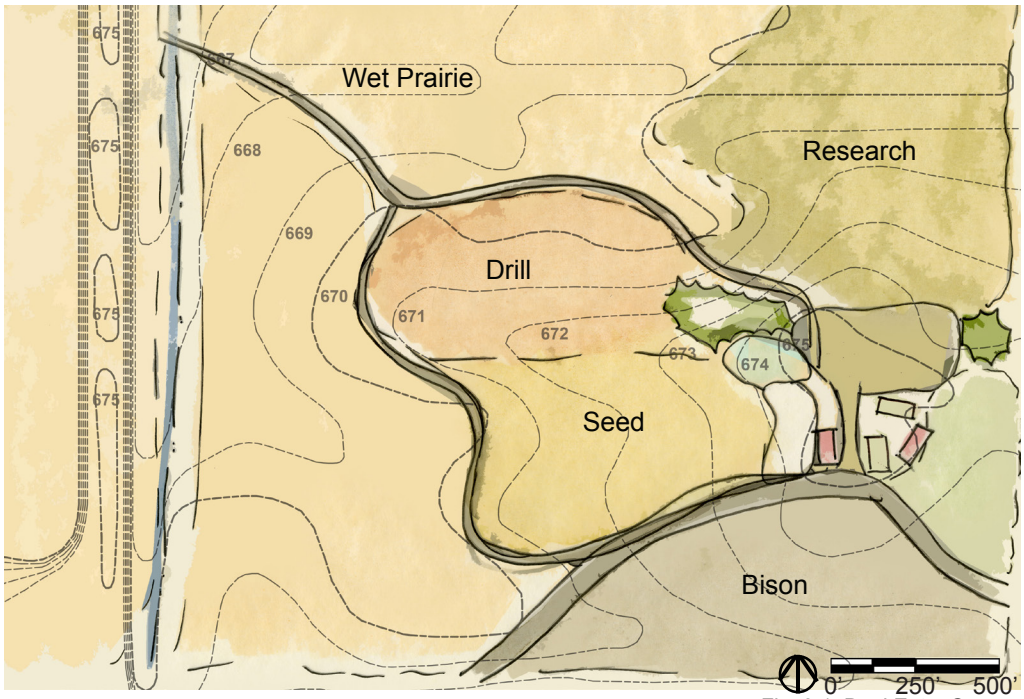


Fig. 9.1. Duel Entry Concept

Dual Entry

Strength:
• Multiple entries, building cluster
Weakness:
• Only prairie restoration, less balance

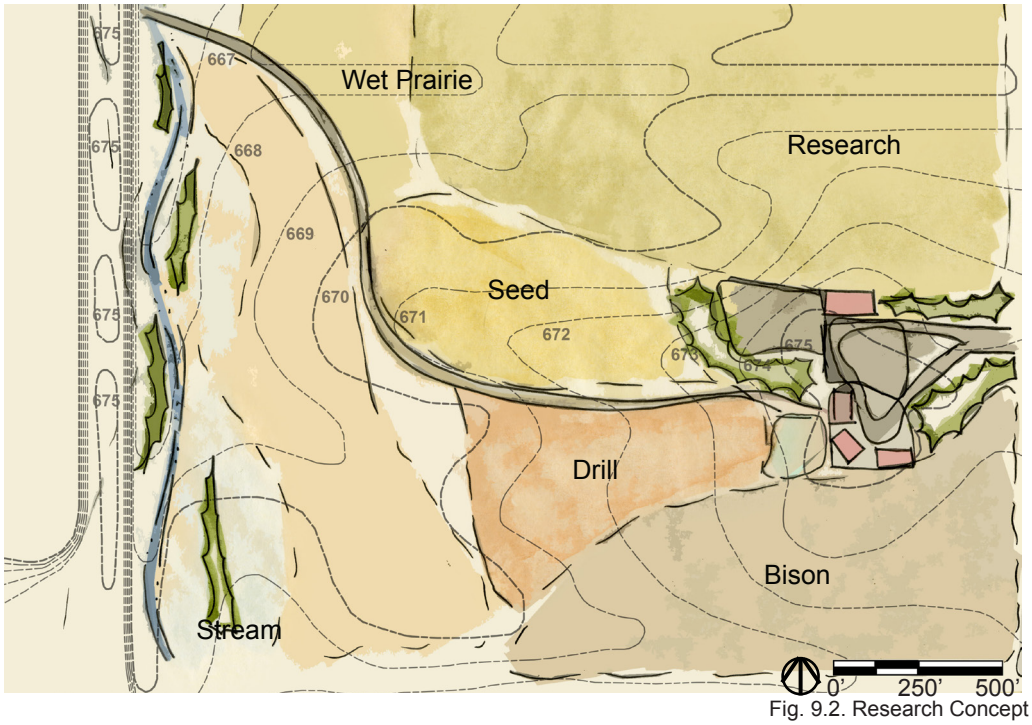


Fig. 9.2. Research Concept

Research

Strength:
• Hydrological restoration, emphasis on research
Weakness:
• Single bike entry, east entry to the site

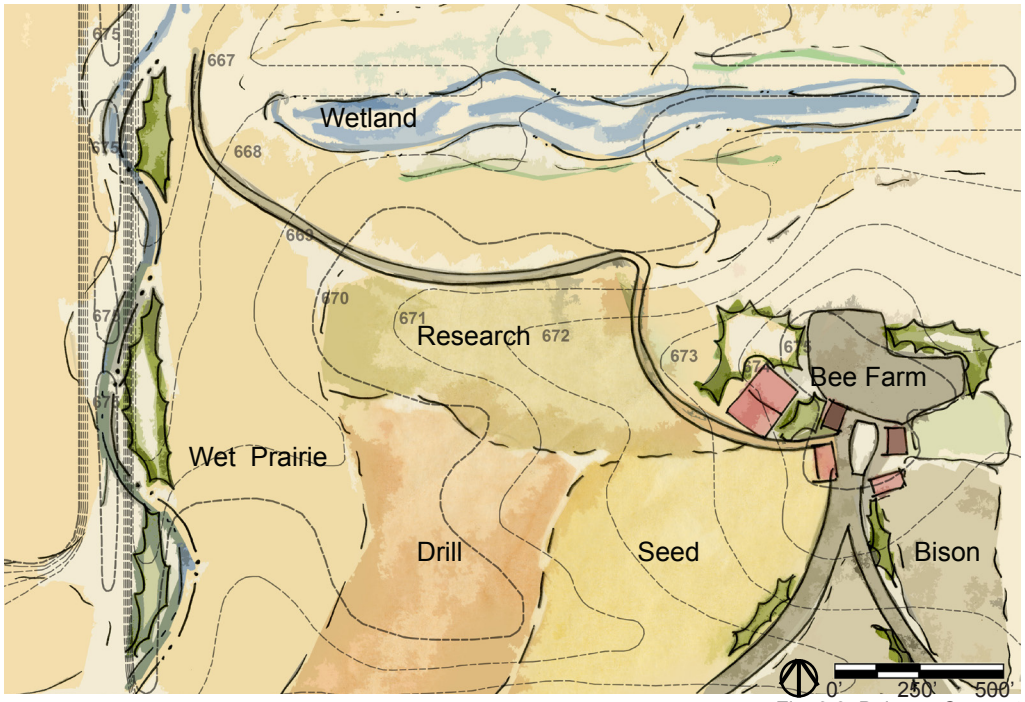


Fig. 9.3. Balance Concept

Balance

Strength:
• Full hydrologic restoration, balance of areas, south entry
Weakness:
• Separation of parking and buildings, single bike entry

The first concept, Dual Entry (Fig. 9.1.), looked at having two entrances for the overall site and for the incoming bike trail. The hydrology on the site was not modified. Then the second concept, Research (Fig. 9.2.), located the entrance on the east and restored the ditch to a meandering stream. Also, the research facility was located away from other buildings to give it seclusion. The last concept, Balance (Fig. 9.3.), created an entrance from IN 14. The different prairies were split into equal areas. Most importantly, the stream was meandered and a wetland was created to represent other ecoregions found in the greater national park.

Elements from all of the concepts showed up in the final master plan. The two bike path entries were pulled from the Dual Entry concept. The bison prairie was located in the northeast corner, as it was in each of the concepts because it would act as a landmark. The research facility was separated from other buildings as it was in the Research concept. The entire hydrology was restored as it was in the Balance Concept. Therefore, different elements from all of the concepts and a meandering calculation created the layout for the master plan.

Design Development

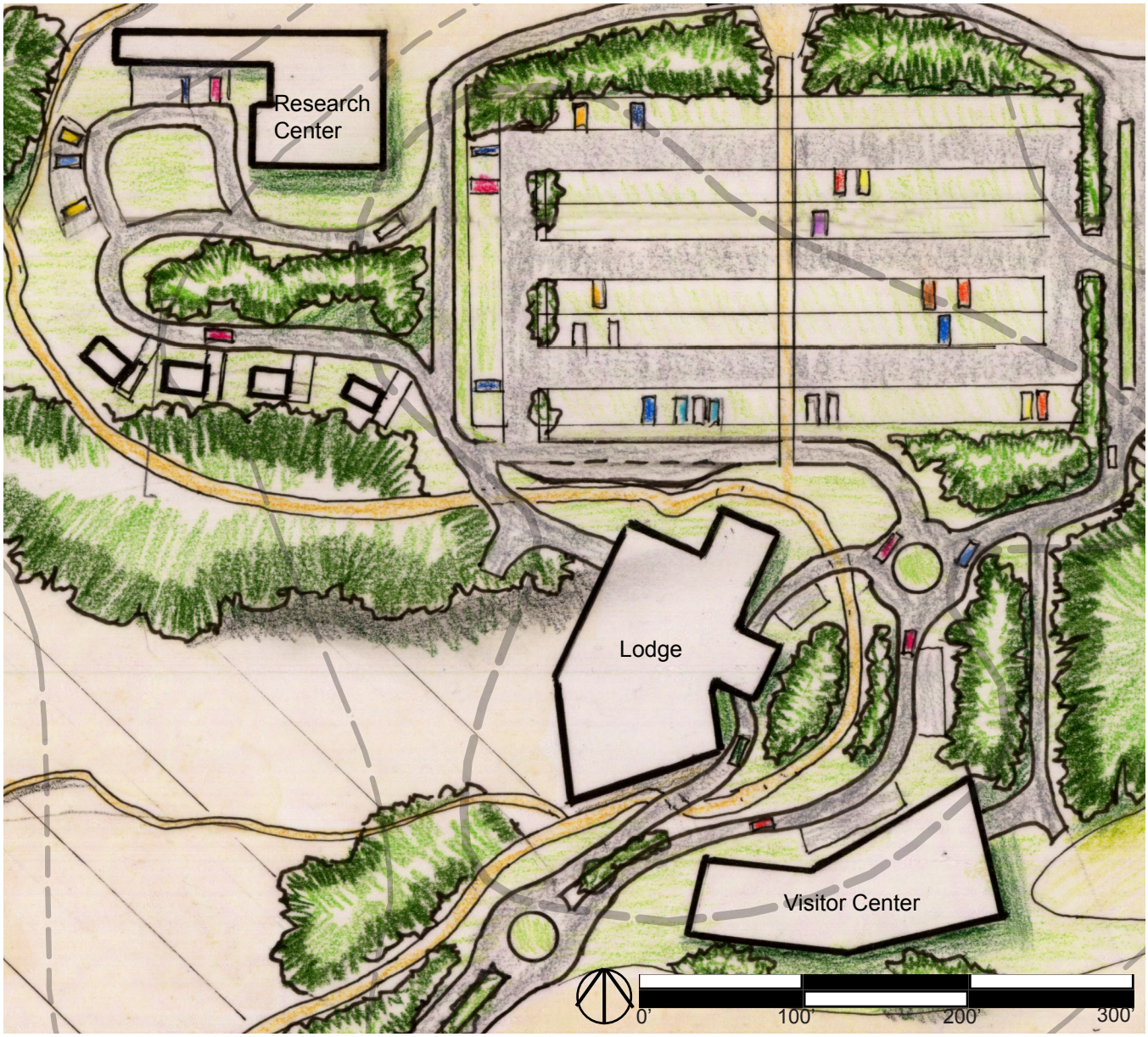


Fig. 10.1. Initial Master Plan

After the concepts were created, an initial master plan (Fig. 10.1.) was designed. The village was based solely on soil suitability, but disregarded the connections between parking and the buildings. However, the location of the visitor center stayed in the same position for the final design.

Several bubble diagrams were created to look at the organization of the village, within the site design. The first plan did not move people through the space effectively in Fig. 10.2. Thus, the next concept looked at grouping multiple buildings together in Fig. 10.3. Then the last concept separated the parking lots and buildings into their own groupings as shown in Fig. 10.4. This was the most successful use of space, but had the largest footprint However, in order to create a sense of seclusion, this concept was developed into the final site design.

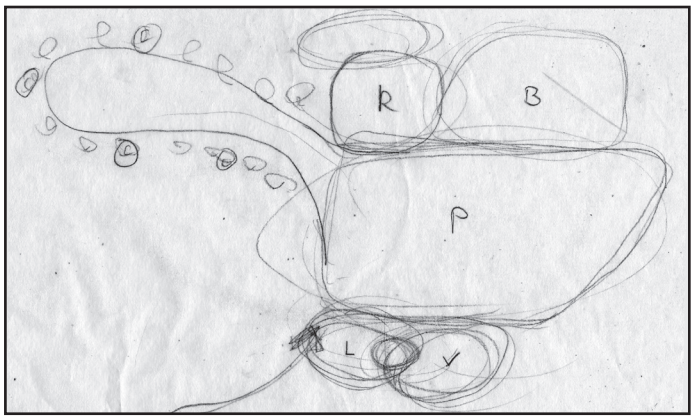


Fig. 10.2. Concept 1

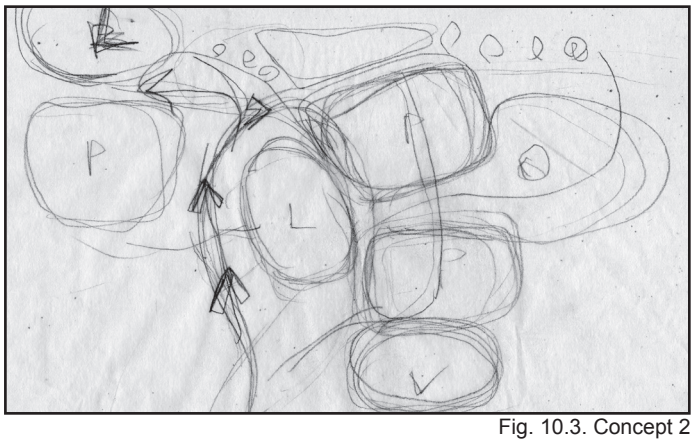


Fig. 10.3. Concept 2

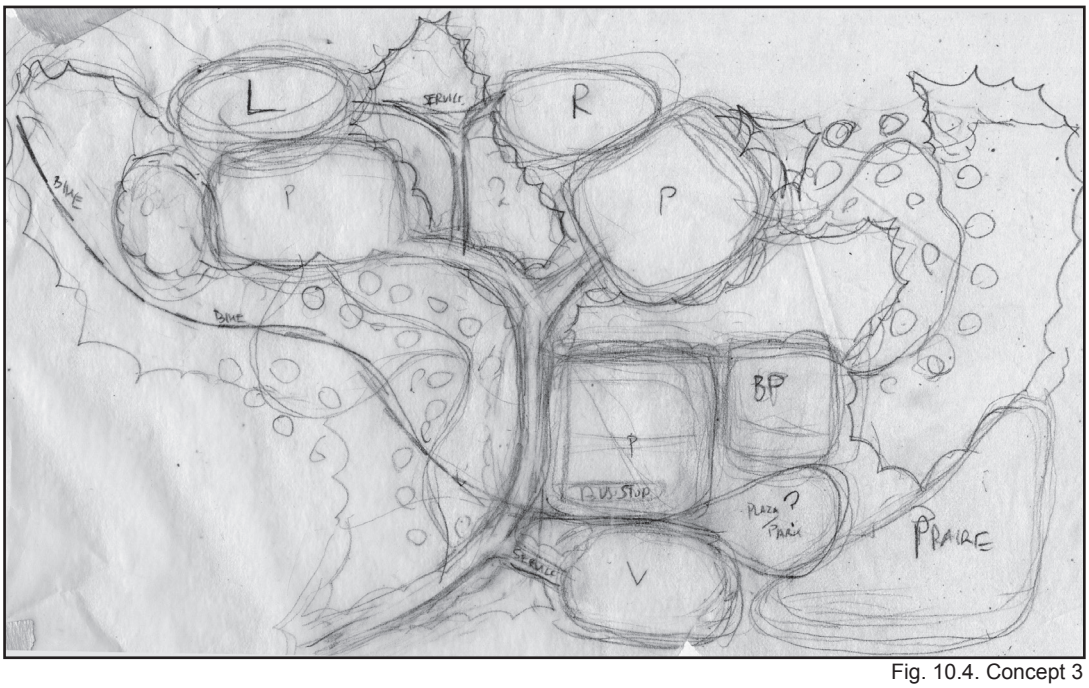
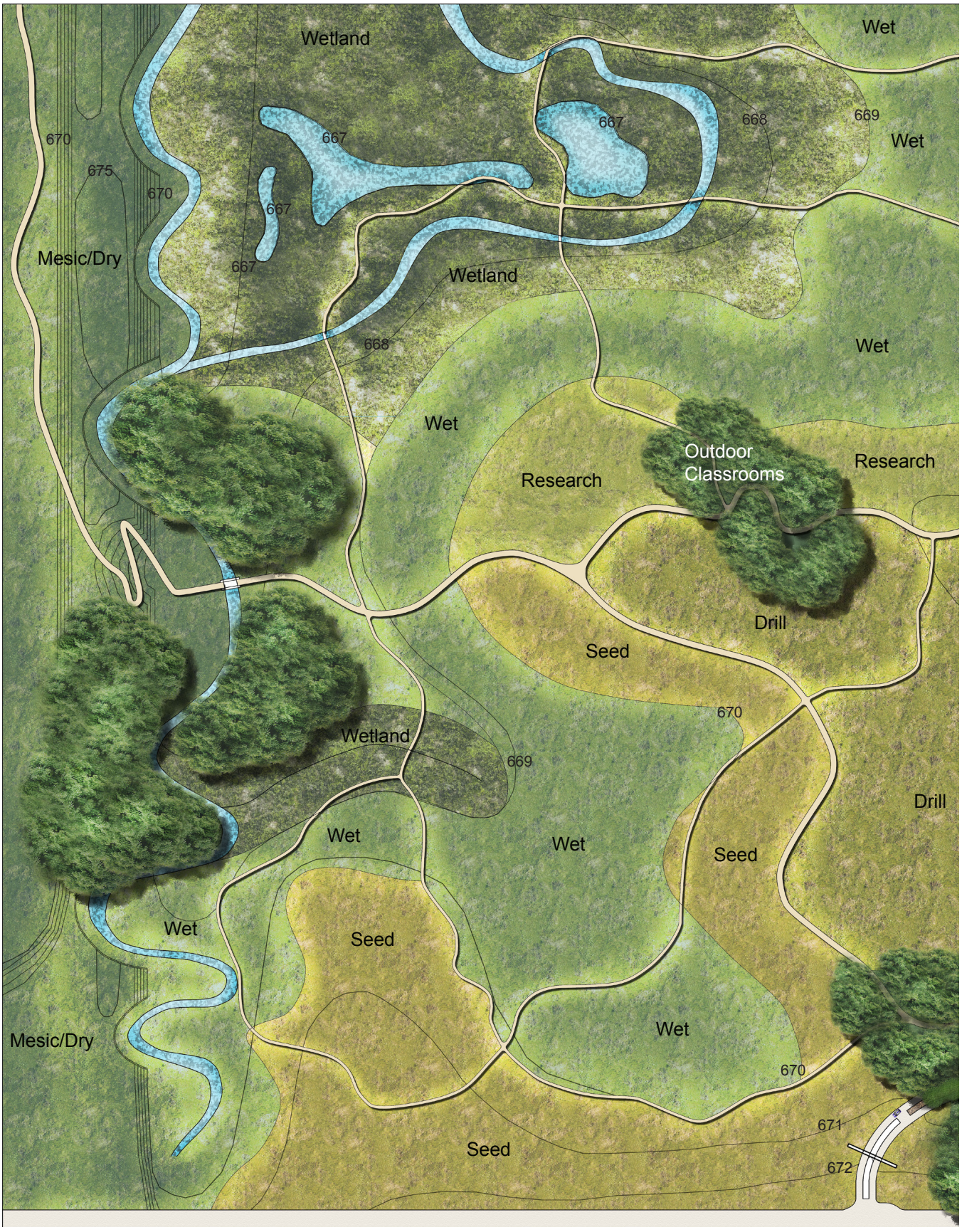


Fig. 10.4. Concept 3

Master Plan


Wetland
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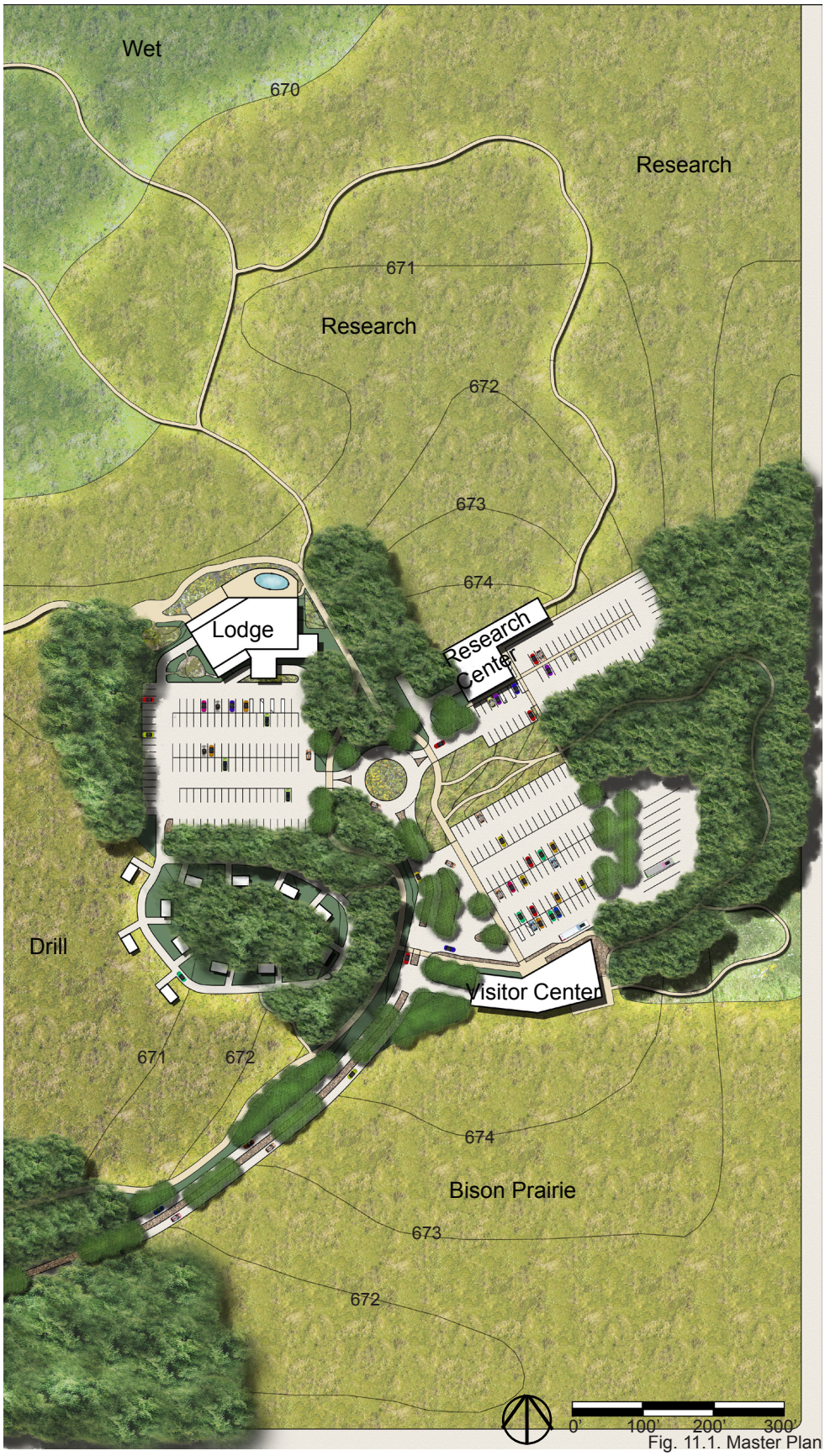


Fig. 11.1. Master Plan

The design for the 150 acre master plan (Fig. 11.1.) located the village on the eastern side of the site where the highest elevations occur. All of the facilities have their own parking lots that relate to the buildings. This decreases the distance visitors have to travel. The visitor center is situated near the entry of the village with a view out over the bison prairie. The research center is oriented along specific prairies that would be used for research purposes. The lodge is secluded from the rest of the village in order to give a sense of privacy. A series of cabins are located on the western edge of the village providing an experience in the wooded area and along the prairie.

The prairies around the village are determined by various uses and topographical locations. The drill and seed prairie provide examples of different seeding techniques. The wet and mesic/dry prairie are representative of prairies one would find throughout the national park. A series of paths wind their way through the prairies offering variable lengths to walk. The bike/ pedestrian path makes its way in from the northwestern corner of the site and loops through the village. The hydrological conditions were restored to a stream and wetland. The entry to the site passes through different prairies and emerges next to the visitor center, providing clear access.

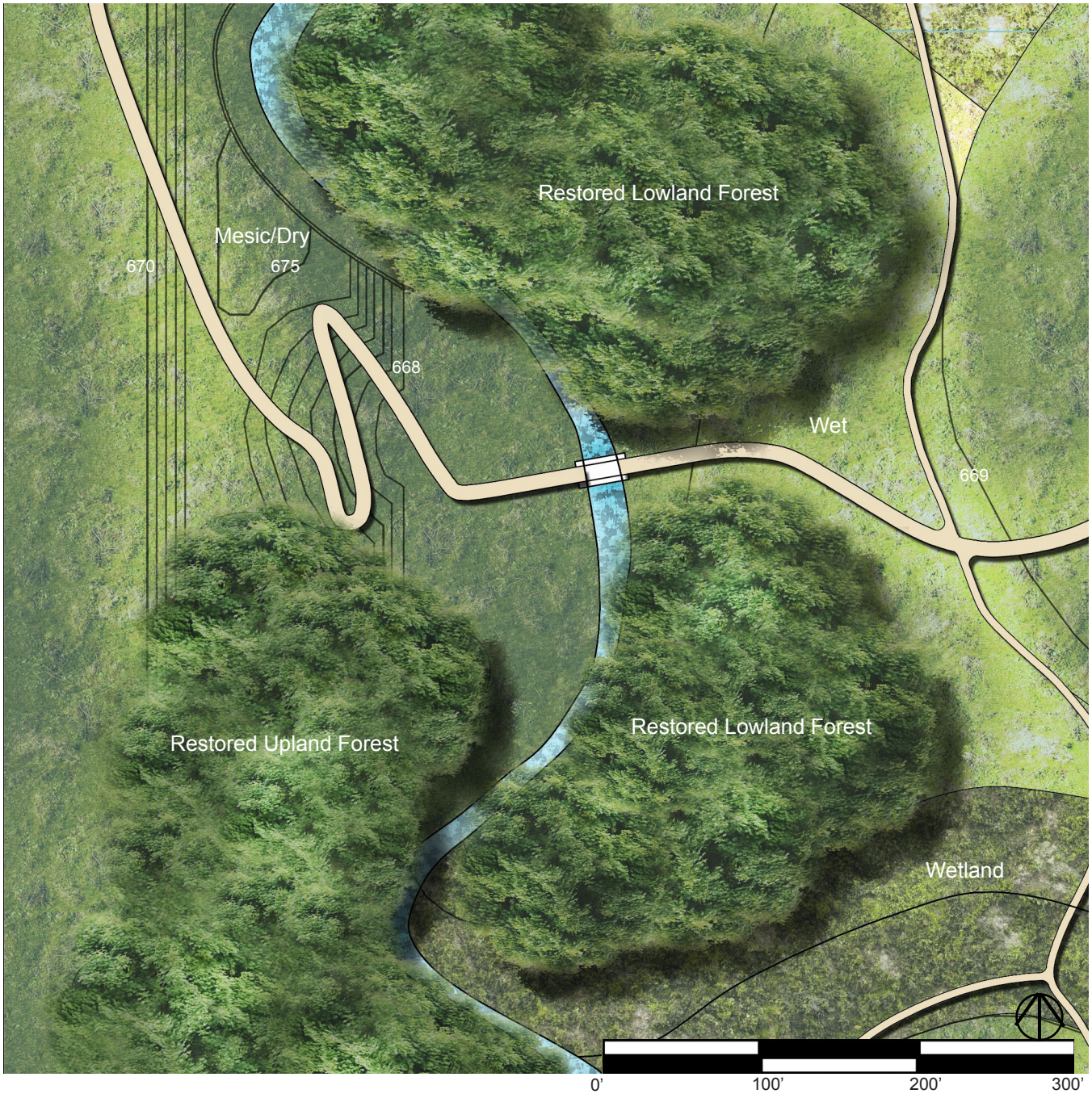


Fig. 11.2. Stream

The stream (Fig. 11.2.) provides visitors a relief from the vast expanse of the prairie. As one heads up the hill, they get a chance to look back at the prairie through the viewshed created by the forest. The forest along the stream provides habitat for a variety of animals. Furthermore, the lowland forest and wetland overlap creating rare forested wetlands.

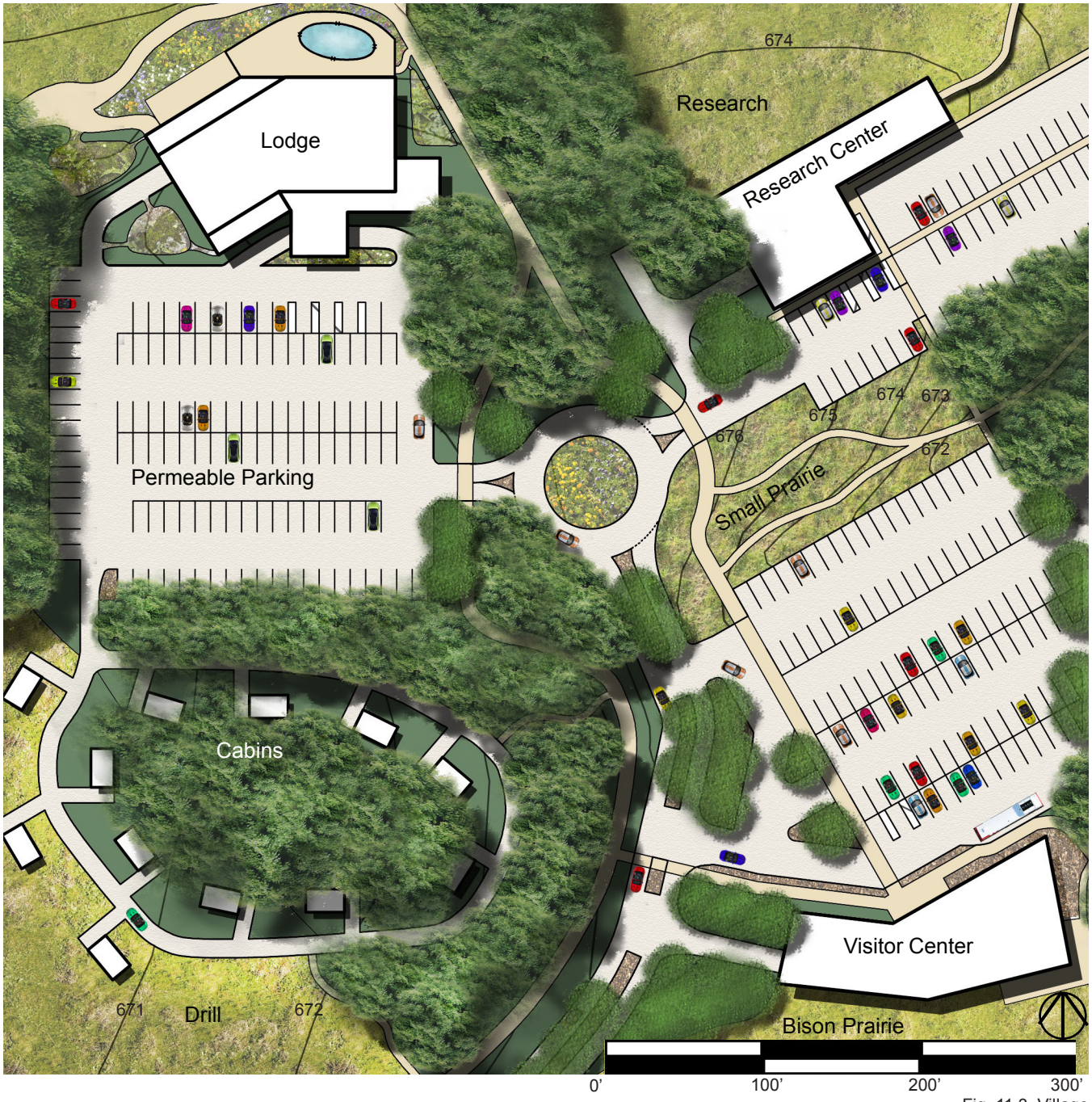


Fig. 11.3. Village

The zoom-in of the village (Fig. 11.3.) reveals details of the design. A small prairie lies between the parking lots of the visitor center and research center providing a link between the two. The center of the roundabout features a vegetated center. The parking lots for all of the buildings feature permeable strips to allow of absorption of storm water. There is a bus stop in front of the visitor center to allow for visitors to travel throughout the park on a tour. Lastly, in the wooded areas surrounding the village are outdoor classrooms for students and scouts.

Plan Enlargement

The lodge (Fig. 12.1.) features a green roof on the top and second levels of the building. A rooftop terrace looks out upon the prairie and offers visitors the chance to look at the vegetation of a green roof up close. Porches line the backside of the building looking across the prairie to the wetlands. The restaurant is on the first floor of the building providing a view out onto the prairie as well. A trail head is located right outside the lodge, and acts as a meeting place for families before they go out on a day's hike. Rain gardens capture any of the storm water that isn't gathered by the green roofs. The front of the lodge provides a covered drop-off location for visitors and guests.

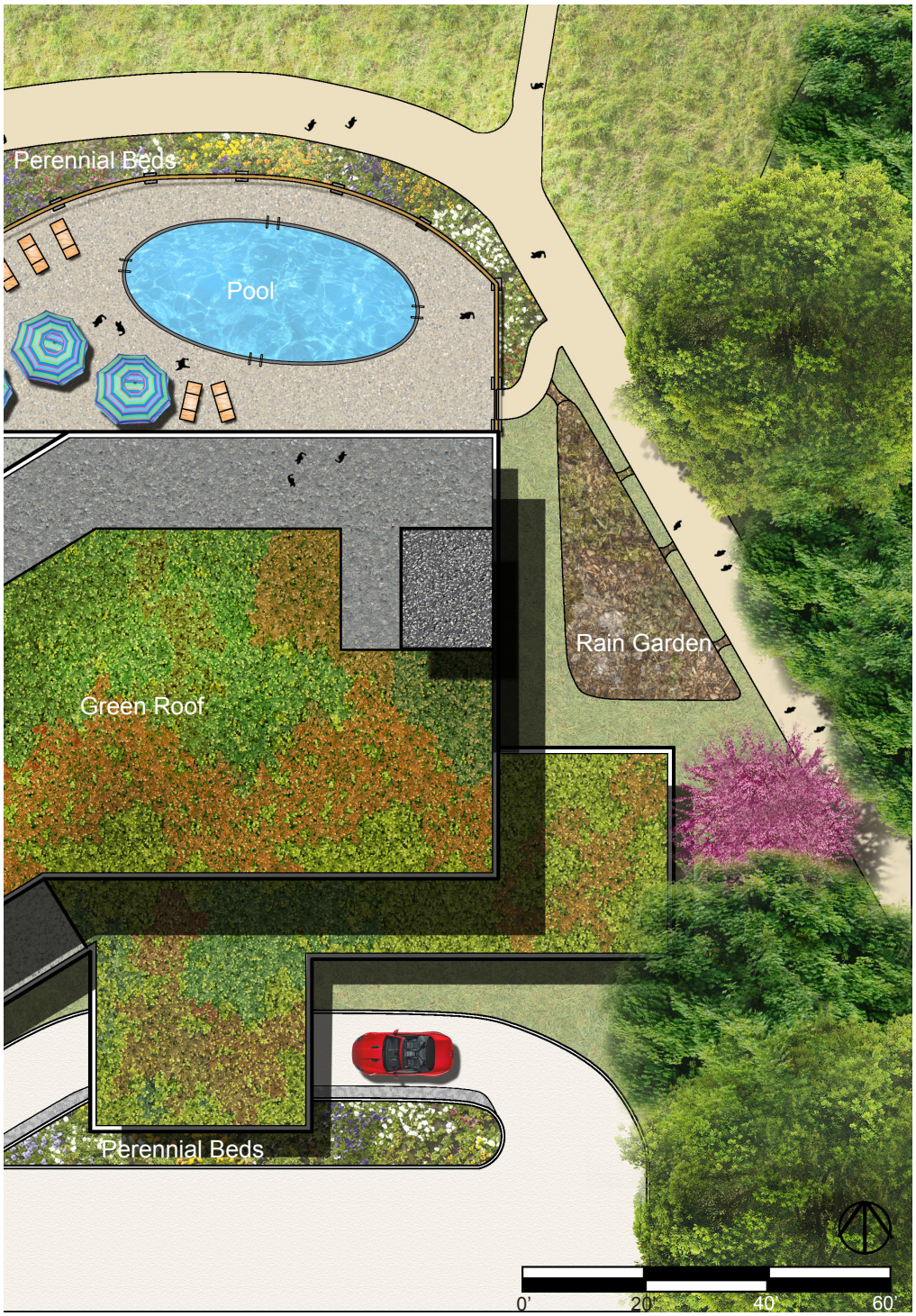


Fig. 12.1. Lodge

Sections

Sub-Emergents Pedestrian Path/Overlook Grasses

Bike/Pedestrian Path

Fig. 13.1. displays a section of the experience out in the wetlands. The overlooks provides a view of the different plant types, such as emergents and sub-emergents. Fig. 13.2. is a section of the cabins located in the wooded area. A drive provides access to the cabins, but is small enough to discourage high traffic use. Bioswales capture any runoff from the roadways. The bike/pedestrian path is located far enough away from the cabins as to not interfere with the private experience. The wooded area provides habitat for species that don't thrive in the prairie.

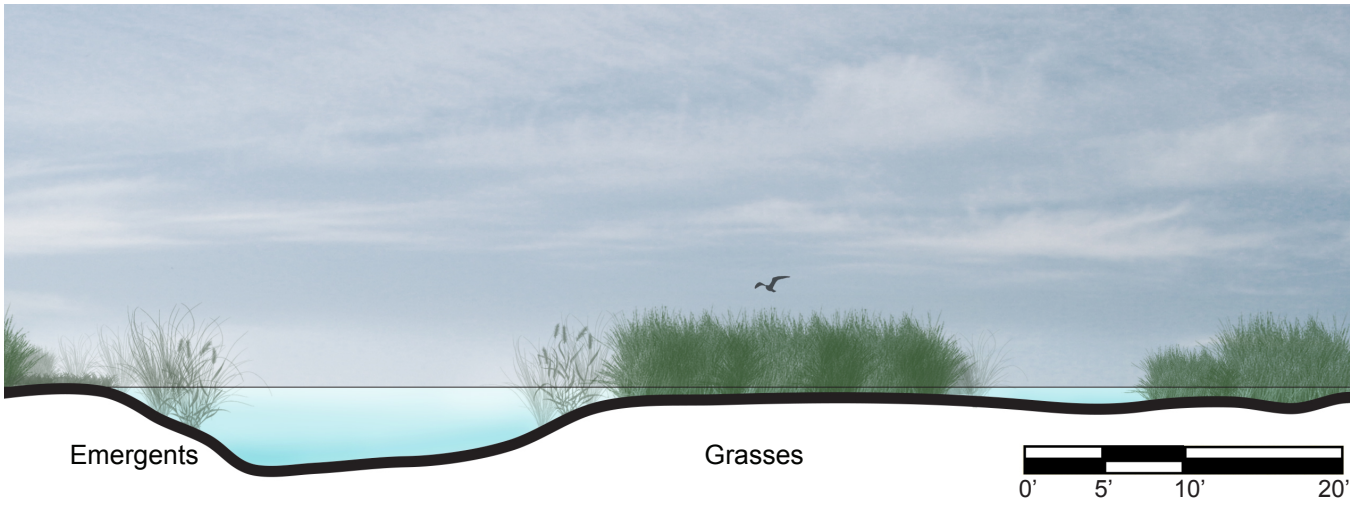


Fig. 13.1. Wetland Section

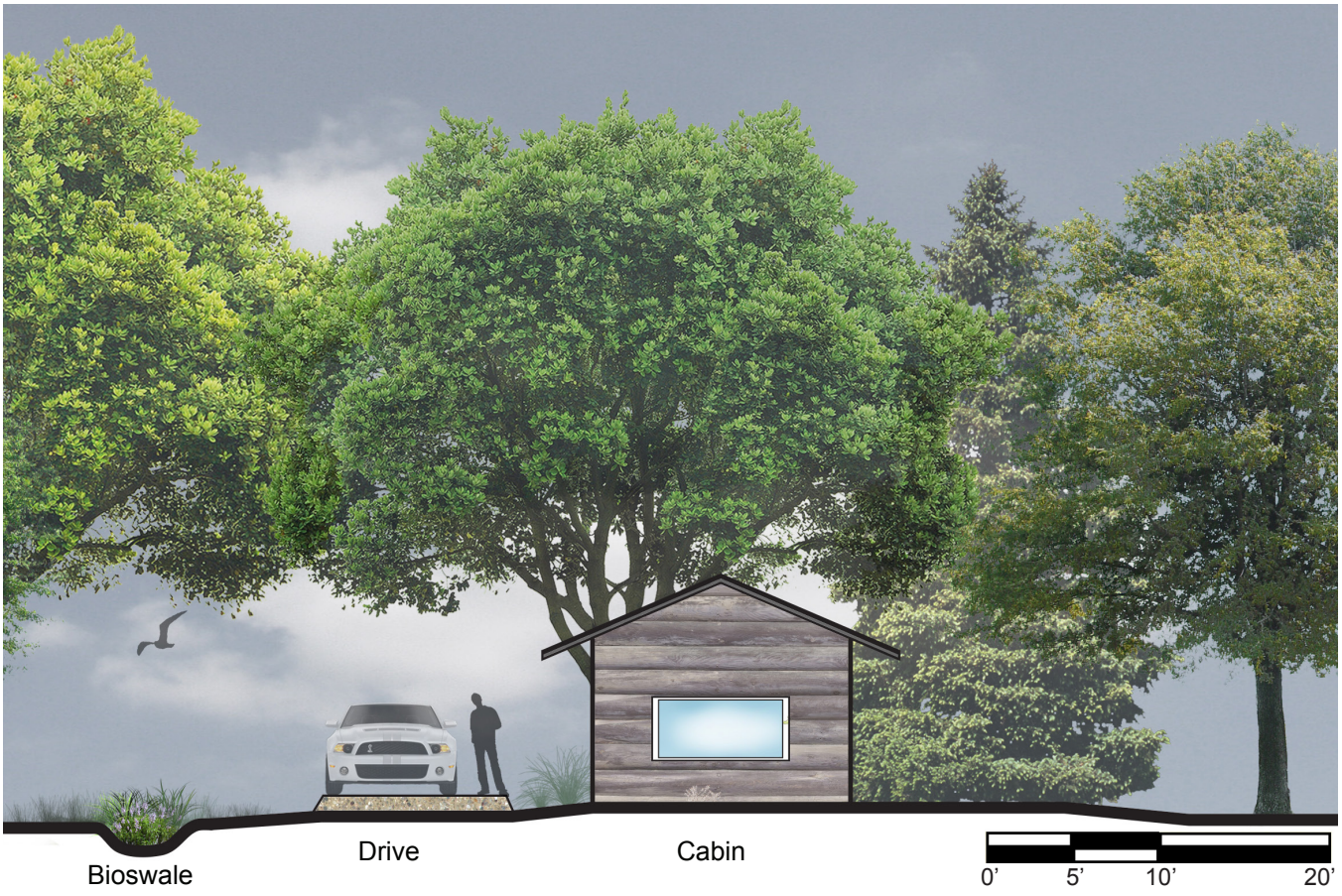


Fig. 13.2. Cabin Section

Figure 13.3. is a representative section of the entry drive on the way to the village. Visitors enter the site with bison on their right and a view of prairies to the left in between various plantings. Bioswales capture the runoff from the roadways through curb cuts. The bike/pedestrian path runs along the west side of the entry, which helps to reduce the scale of the site. The view of the visitor center slowly comes into view as visitors drive closer to the village. The architectural style is borrowed from Grand Teton National Park.

Fig. 13.3. Entry Section

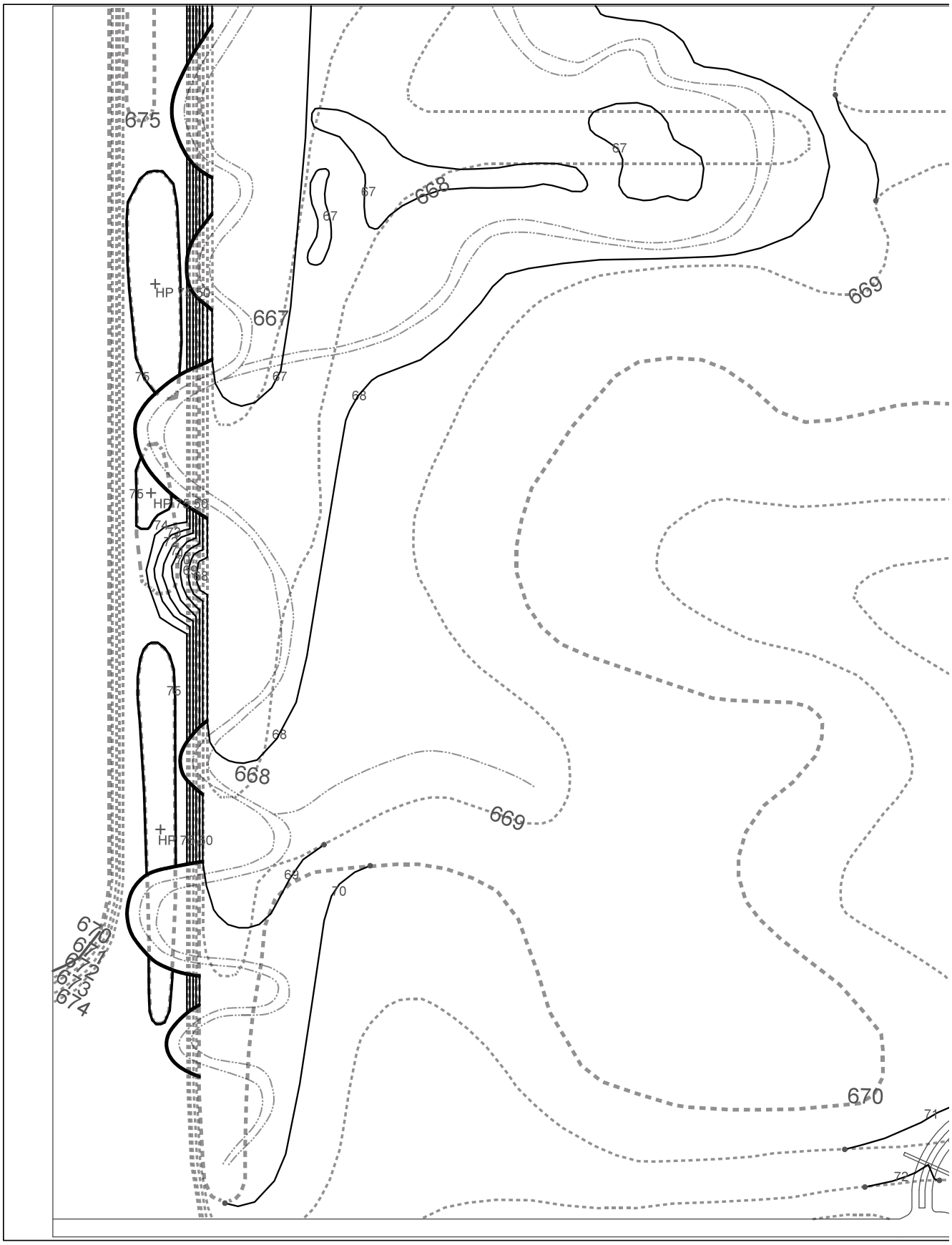
Perspectives

Fig. 14.1. Boardwalk

Figure 14.1. is a representative example of the experience of walking through the prairie. A wooden boardwalk weaves its way between the various plantings. The prairies would have to be mowed on each side during burns to prevent the boardwalks from being damaged. Interpretative signs are placed along the pathways informing visitors about the surrounding environment.

Fig. 14.2. Lodge

Figure 14.2. is a view from one of the rooms in the lodge. The view opens up to the prairie and wetlands in the distance. Guests of the lodge can spend private moments enjoying nature from the comfort of their room. The railing features soundproof glass, which will block the noise from the restaurant below.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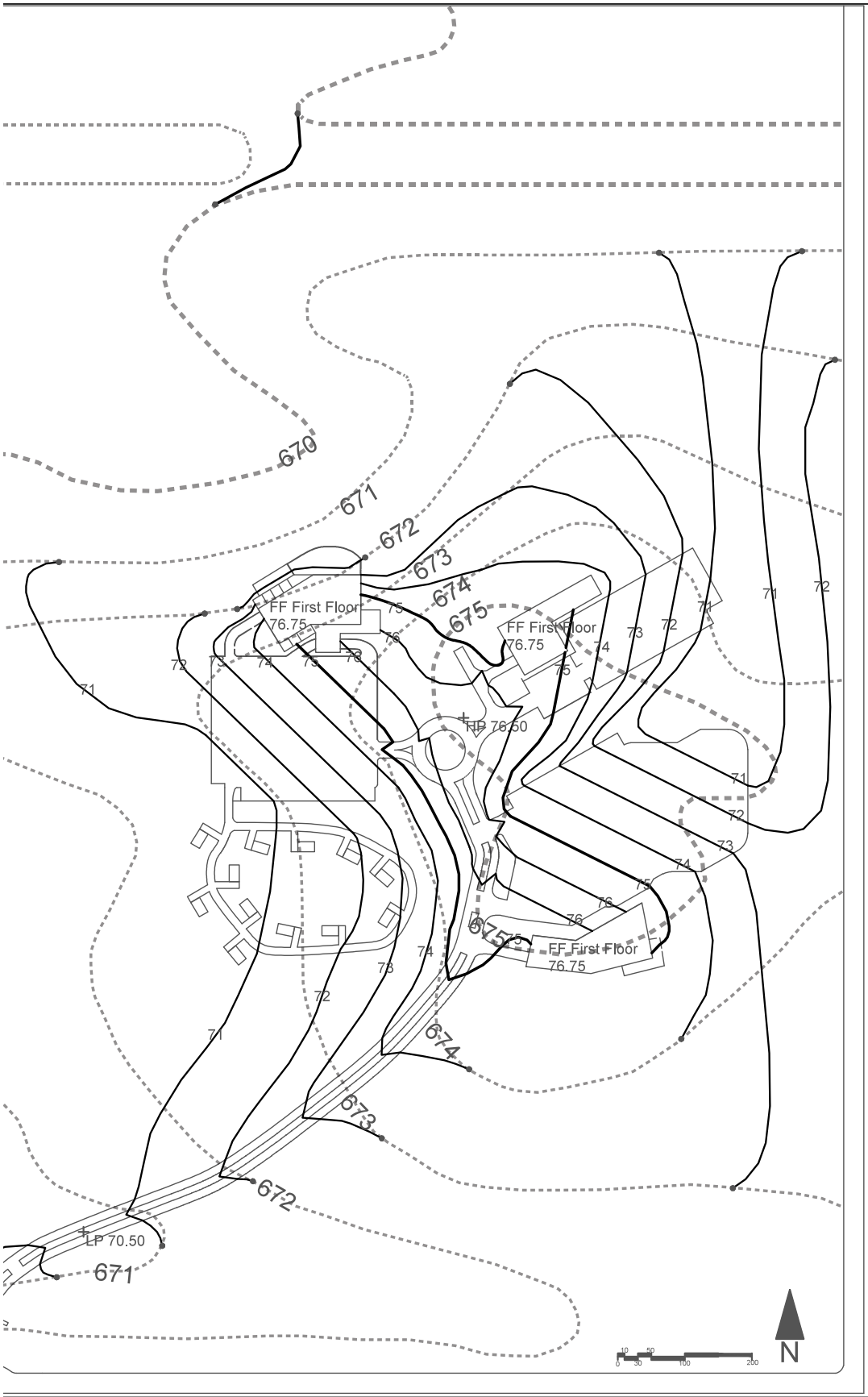
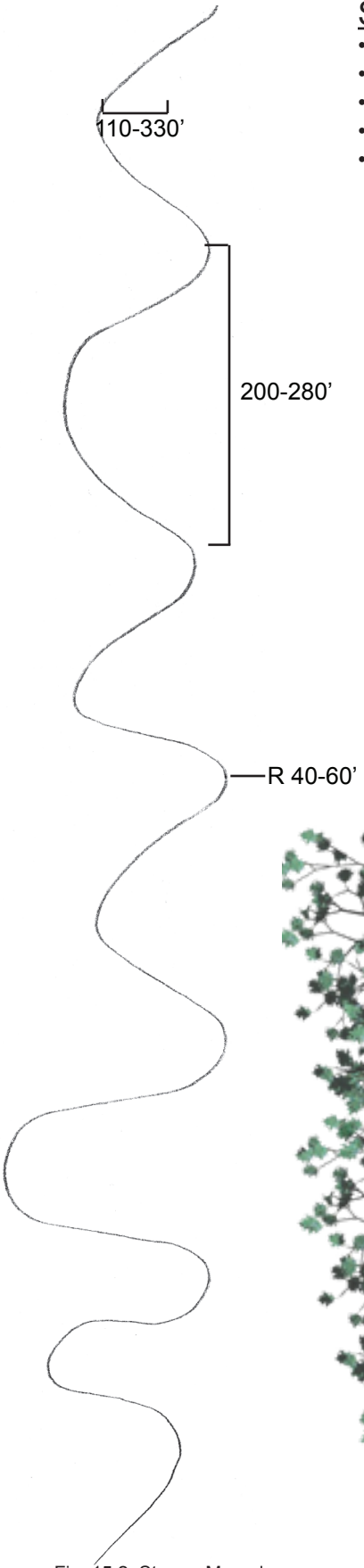


Tallgrass Prairie National Park

Grading Plan
Alexander Salmins
LA 404

Scale: 1:200
Date: 4.7.13

Fig. 15.1. Grading Plan



Stream Meander

- Based on 20’ stream
- Meander Length: 220’ (200-280)
- Radius: 40-60’
- Amplitude: 110-330’
- Pools and Riffles: 100-140’

Instream Cross Vane

- Instream restoration
- Focuses energy of the stream into the center
- Prevents erosion along bends in the stream
- Establishes grade control, reduces bank erosion, creates a stable width/depth ratio, maintains channel capacity, and helps control sediment
- Creates a pool which provides a resting area for fish

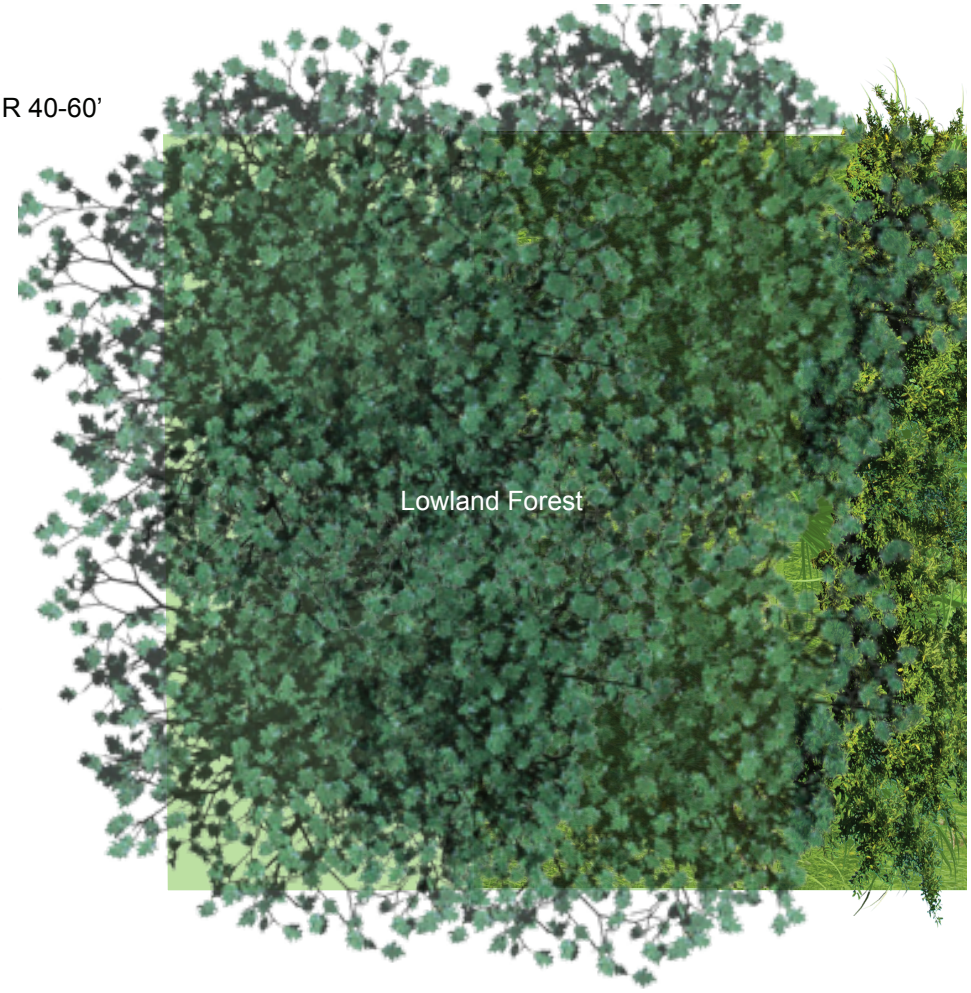


Fig. 15.2. Stream Meander

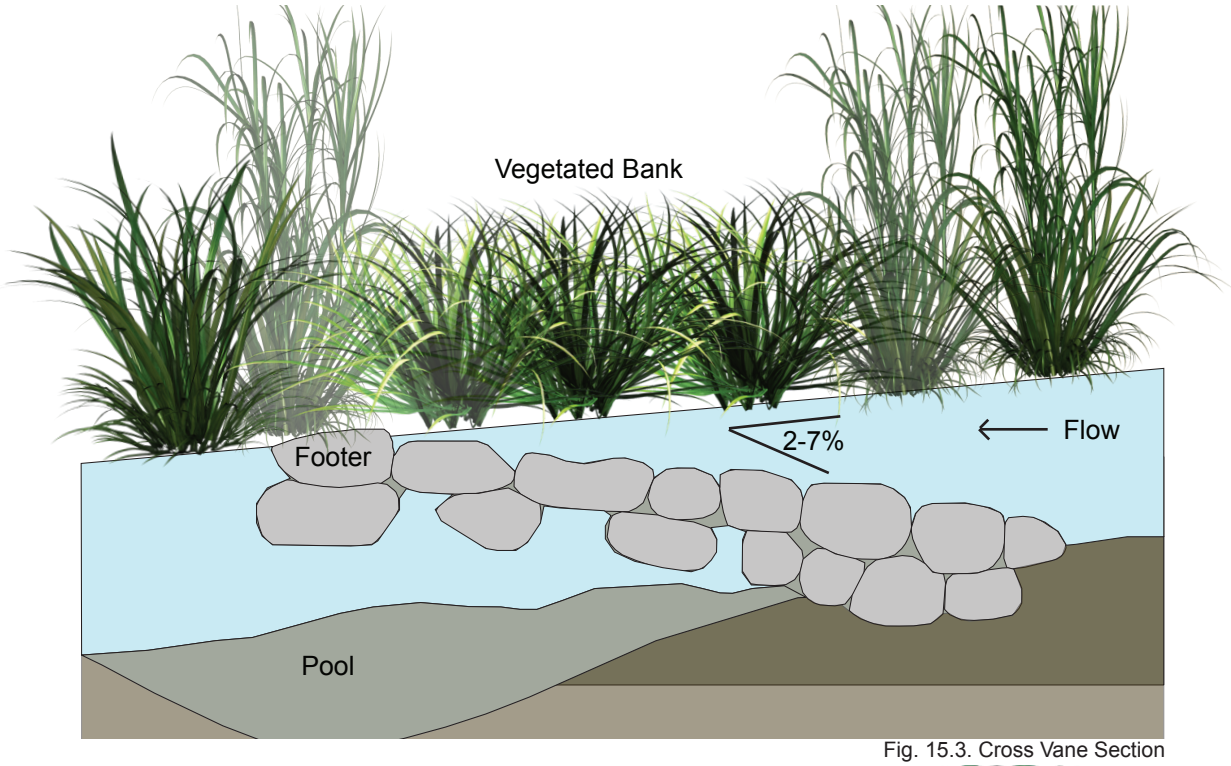


Fig. 15.3. Cross Vane Section

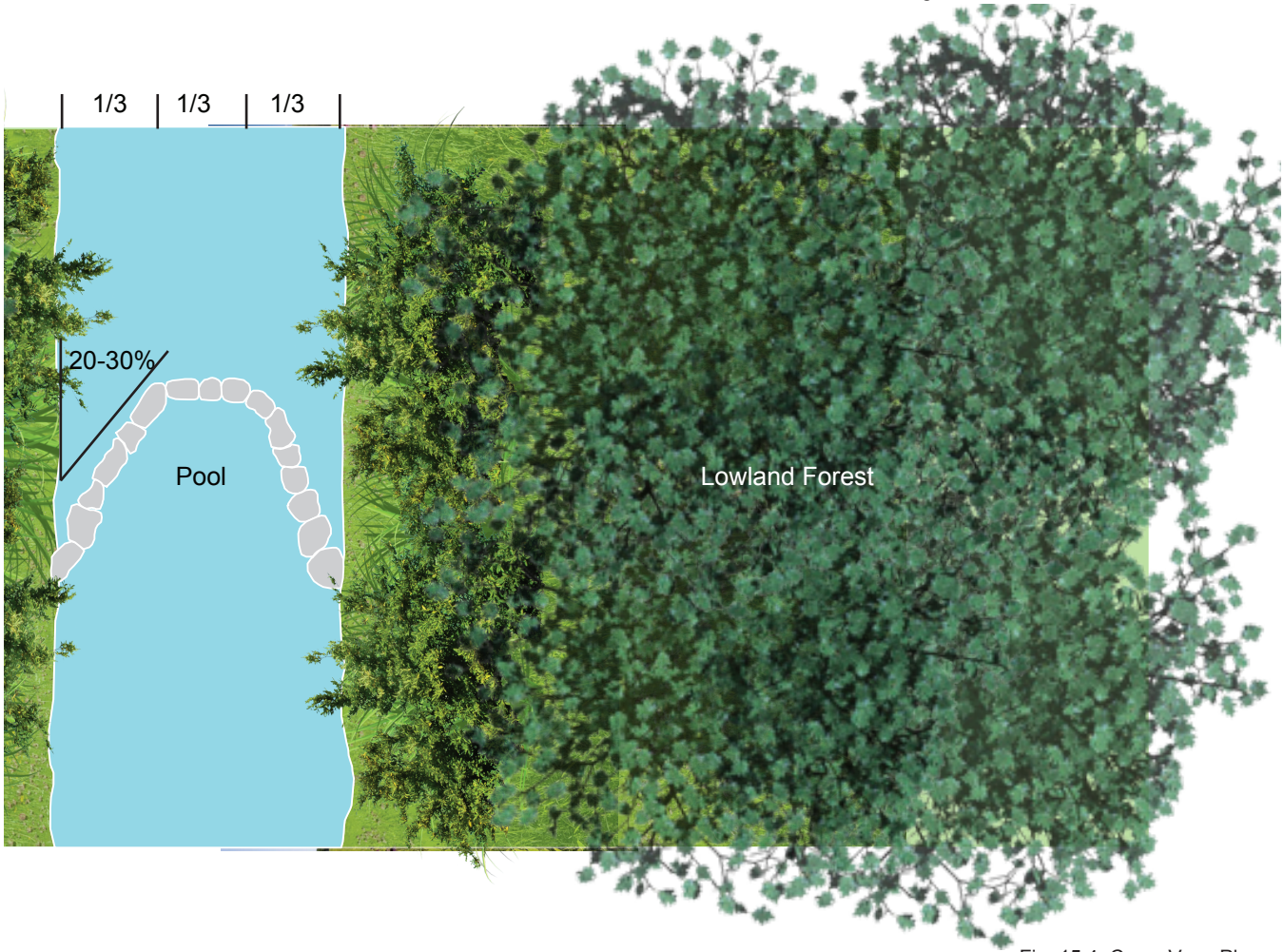


Fig. 15.4. Cross Vane Plan

Conclusion

The design for the 80,000 acre Tallgrass Prairie National Park aims at starting a national trend of restoring the tallgrass prairie. Prairies are one of the most degraded ecosystems in the world, but they compete with the Brazilian rainforest in terms of biodiversity. They are worth saving and bringing back to their historical state. The Tallgrass Prairie National Park stands as an example of how the movement can begin to educate the public about the significance of the prairie.

The design features many different facilities to accommodate the needs of a national park. The regional plan encompasses restored prairies and savannas, such as Conrad Station. There is one village that serves the entire park and marks a grand entry. A campground works to serve both pedestrian and equestrian users. The site plan for the village features a visitor center, lodge, and research center. The site design also features areas for outdoor classrooms. Prairies around the village serve as an example of the greater restoration that would occur throughout the entire national park. A stream restoration and wetland are also part of the site design effort. Overall care was taken in the design process when planning development around ecological features at the regional and site scale.

The Tallgrass Prairie National Park will pull in visitors from around the nation. The national park is 80,000 acres but future phases will continue into the greater grand prairie region and become an enormous national park. The tallgrass prairie can be saved, one restoration at a time.

Appendix

A) Timeline

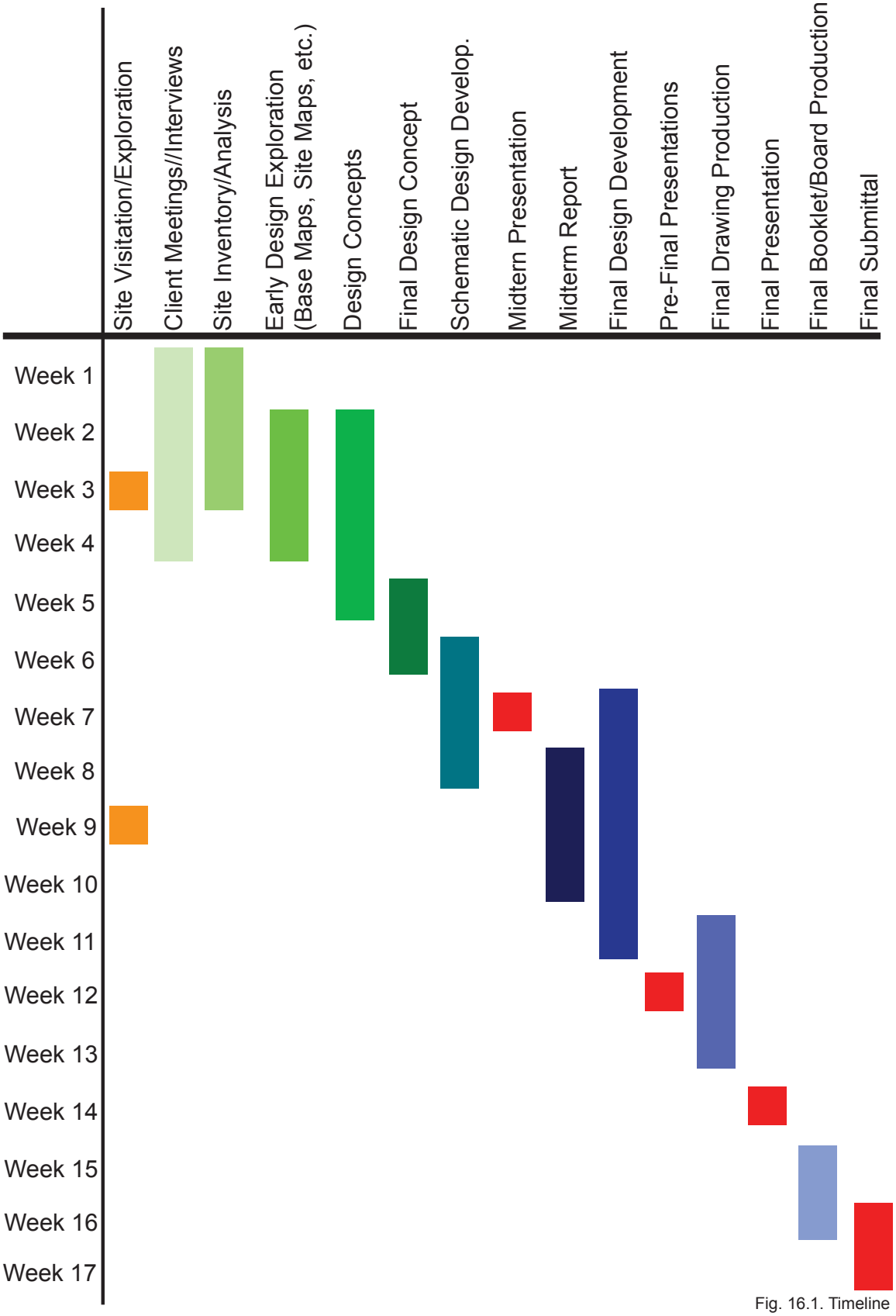


Fig. 16.1. Timeline

B) Systems Timeline

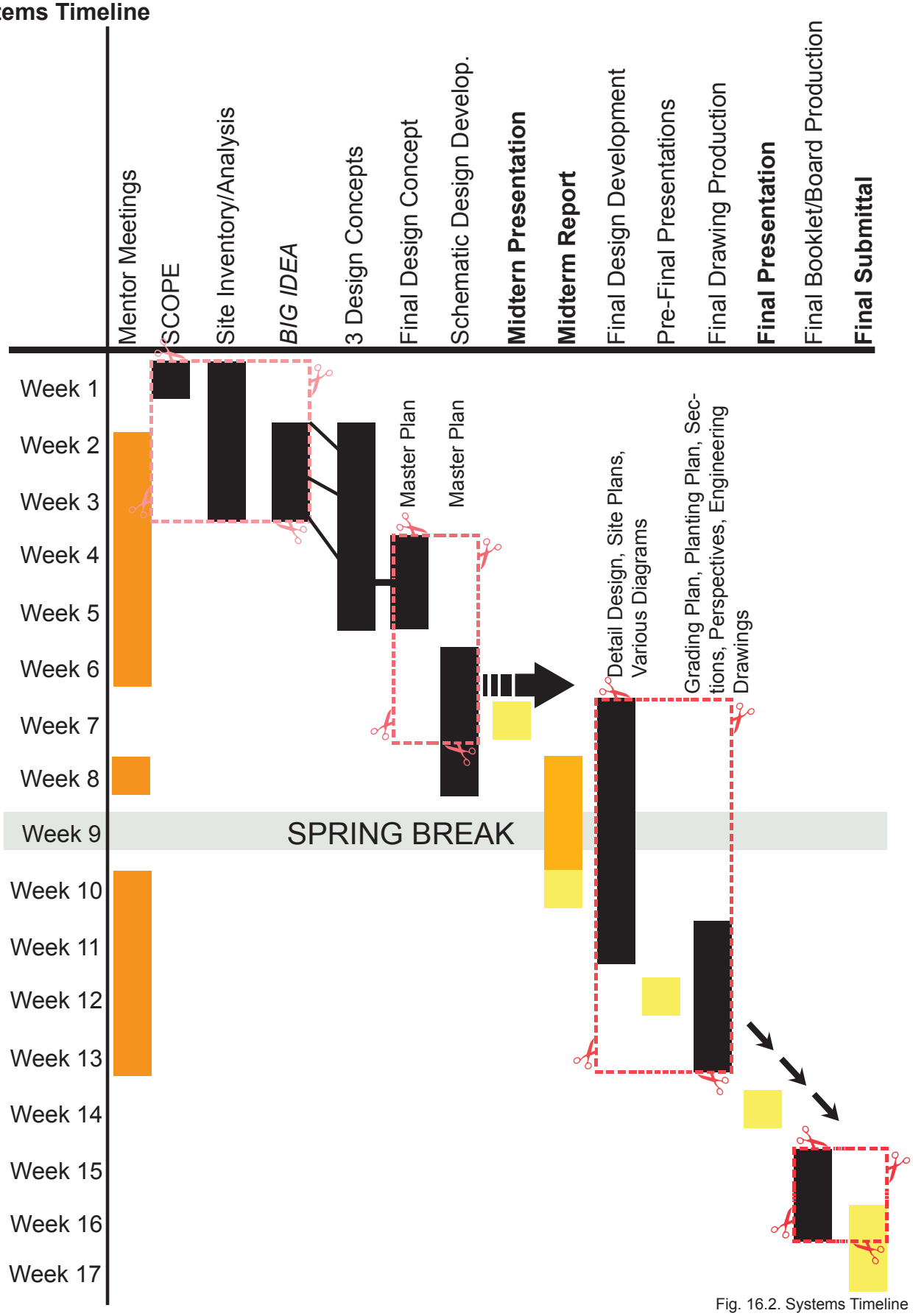


Fig. 16.2. Systems Timeline

C) Maps

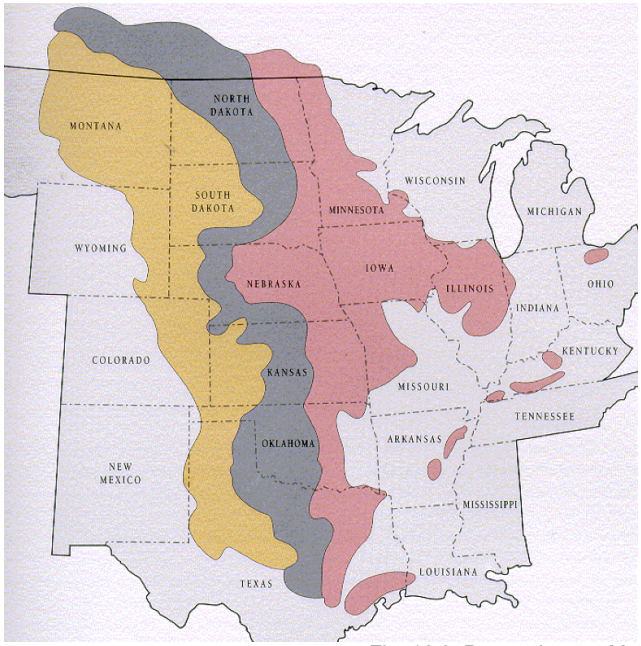


Fig. 16.3. Pre-settlement Map

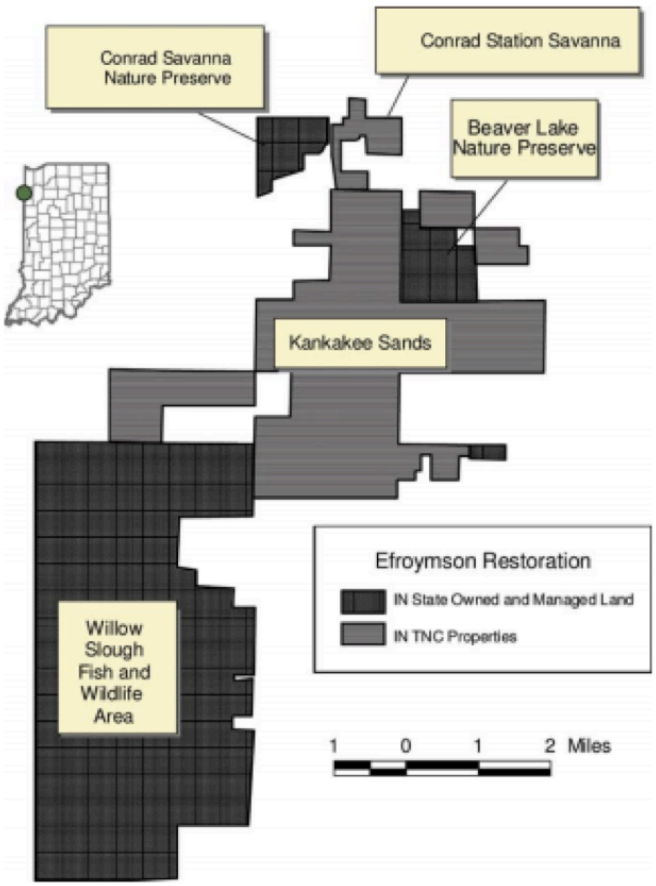


Fig. 16.4. Kankakee Sands Restoration

D) Interview/Survey Questions

Kankakee Sands Interview:

What are the project goals and objectives?

How has the success rate been so far?

Why did you choose the location?

How have you discovered suitability?

What has your design process been?

E) List of Figures

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